

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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Cutting-Off Saw and Gaining Machine.

We present in the accompanying engravings two different views of a new machine now being manufactured by Messrs. C. B. Rogers & Co., of No. 109 Liberty street, New York City, their manufactory being at Norwich, Conn. The machine combines a gainer and heavy timber cutting-off saw for railroad, car and bridge work. The saw carriage travels on ways on a strong and substantial arm, as shown, which is attached to an upright column and gibbed to it. It is raised and lowered by means of screws to accommodate saws of different sizes, and also to regulate the depths of the gains when the gainer-head is being used, as in Fig. 2. The apparatus is provided with a novel automatic device for taking up the belt by the traverse of the saw carriage, which is carried forward and backward by a screw feed driven by power and keeping the tension of the belt the same at all points. The saw and gainer-head work over the top of the lumber, and cut back from the operator, and are less liable to accident, as all loose pieces will go backward. The stuff does not need holding on the table when sawing, as the cutting of saw draws it to the fence blocks on the table. The timber should be keyed when gaining, in order to move it accurately to the lines, by means of the hand-wheel on the table. When the machine is wanted to gain wide stuff, the table is moved back on the base by means of rack and pinion and the hand-wheel on the side of the base box. When sawing, the table should be locked by the bolt on the front of the table to prevent its being moved endways, so the saw will not pass in the groove in the table. The machine will carry a saw from 18 inches to 34 inches, and 14-inch gainer-head. All parts are mounted upon a substantial base, so that in moving the machine none of its parts are displaced. It is provided with a counter-shaft, with tight and loose pulleys, 8 inch x 14 inch, and should make 365 revolutions per minute. The weight of the machine is 4500 pounds.

Metallurgy in Sweden.

Mr. P. W. Moen, of Worcester, Mass., in an interesting paper on the above subject, gives some particulars which, aside from their value as giving an idea of the mineral wealth of Sweden, are of considerable historical interest. According to Mr. Moen, the extensive forests of fir, spruce and pine, and the practically inexhaustible deposits of various ores, constitute the natural wealth of the country. Not all parts, however, are equally blessed in the distribution of this wealth. If we except the coal-bearing fields of Skane, in the south—the only coal fields yet known in Sweden—the mountain of titaniferous ore at Taberg, near the lower end of Lake Wetteren, the productive copper mines of Atvidaberg, and a small number of widely-scattered mines, principally of iron ore, the mass of mines of all kinds lies closely together, north of the latitude of Stockholm, comprised within a district of not more than 100 miles in extent from north to south, nor more than 150 miles from east to west. Several provinces of the south are nearly as free from forests as some of our Western States, but, beginning also with the latitude of Stockholm, they reach co-extensive with the breadth of the country itself northward to the Arctic circle. It is mostly along the banks of the countless rivers which run in parallel courses from the Norwegian mountains and empty into the northern part of the Gulf of Bothnia that the enormous quantities of timber are cut which supply the constantly increasing demand of England and of France. Mining has been followed in Sweden from very early days. The oldest mining town in Sweden is Falun, the capital of the historic Province of Dalecarlia, situated about a day's journey by rail to the north and west of Stockholm. It is impossible to say when the famous copper mine there was discovered. There are those who maintain that the bronze ornaments of Solomon's glorious temple were made of copper taken from this mine. Antiquarians assert that the ores have not been worked for more than 2000 years. In those days mining was carried on not by a company, but by many independent owners called "bergsmannen," each of whom had his own corps of men engaged in breaking out the ore and carrying it to his smelting furnaces, perhaps many miles away, as the copper slags found far from the mine itself show. The ore was richer then than now. It lay in abundance near the surface. The appliances were not such as to enable them to go to any great depth. When one vein proved unproductive or lay too deep a new vein was taken or work begun in fresh spots on the old vein. Many a man's fortune was made by finding a deposit of pure or nearly pure ore. They still tell in Falun of one bergsman who was so rich that he shod his horses with silver, and of another living in an adjacent parish in which the church was built upon a hill so hard to climb, by reason of its roughness, that the magistrate offered to cover the hill with plates of copper. It was then no difficult matter to smelt the ores with wood or charcoal in a small furnace, not unlike the modern blast furnace, save in height and in the details of its construction, and to obtain a rich return, though there was left in the slag more copper than is now found in the ores

from the same mine. This dry process, so called, has been followed until within about a couple of years, when the last furnace of the three or four of a kind in Falun was abandoned. To return to the early history of the mine. It is known that it was worked

afterward lay idle for several years. In 1720 the shares in the mine were divided in 1200 parts, and as many as 60 or 70 small furnaces were engaged in smelting the ores. One large company now control the entire working of the mine.

lowed at present. Taking any one of the lateral passages as a base line, the miners break out ore to right and left, and above to a distance of several feet, following, of course, the vein or dip of the deposit, and they continue in the same direction until

the roof and sides are supported by strong timbers, but as soon as all the ore has been broken out the timber is removed, and barren rock is filled into the space, thus providing at once a use for worthless stone and a security against the possibility of caving in. The water is removed from the mine by the simplest of wooden pumps, which work day and night. The water is raised a few feet, runs out through a trough, and then is pumped a few feet higher, and so to daylight. A little wheel, driven by the water thus pumped, is made to sound the bell at the wheel-house some distance away, and an interruption in the ringing of the bell signifies that, for some reason, the pumps are not working. The oldest method employed to free the mine from water was by simply passing it up in buckets by hand, and it was not before the beginning of the sixteenth century that any method of employing power was introduced anywhere into Sweden. At that time a kind of paternoster work, originating in the Joachimsthal, Germany, was used, and about the middle of that century the present system of communicating power by beams, joined end to end, and alternately ascending and descending, came in vogue. In order to break out the ore or to drive passages, firewood in long sticks was laid on the rock, ignited and allowed to burn until the wood was consumed. Then the rock, either by cooling itself or by being cooled with water, cracked and fell, or was easily broken out. This practice was not only costly, but tedious and dangerous. The use of powder was not begun at Freiberg, in Saxony, until 1613. In 1644 it was in general use at Freiberg and at Clausthal in the Harz, and in 1670 in England. But in Falun it did not come into use before 1720, although this mine was not the first to try it. The holes made were then so large and the charges of powder so heroic that harm was done to the mine, and so much that the authorities once forbade its employment, though they soon withdrew their objections. The boring is now carried on by hand principally, but in 1879 compressed air was used experimentally with good results. Both dynamite and powder are used as explosives.

THE ORES.

The principal ore mined at Falun is copper pyrites (chalcopryite). It occurs in rock composed mainly of quartz, chlorite and hornblende. Chalcopryite occurs also in great quantities, sometimes along with the copper pyrites, and sometimes alone. Much galenite and a little zincblend are also found in varying quantities in different parts of the mine. Gold, also, in minute quantities, $100 \frac{1}{2}$ oz. being the highest per cent. Within two or three months a very respectable find has been made of native gold in a true quartz fissure. How far this deposit may continue is uncertain. The mine is rich in many minerals valued by the possessors of cabinets; among the most remarkable are garnets the size of a man's head. When the ore has been raised to the surface it is broken by hand, sorted or sifted, like coal, and the ore containing 10 to 12 per cent. of copper, preferably, but even down to as low as $1 \frac{1}{2}$ to 2 per cent., is subjected to the so-called wet process. It must first be calcined or roasted to free it as far as may be from sulphur. This is done in kilns cut into the hillside and walled with brick or stone at the back and sides. The top and front are open. The cavities are about 30 feet long, and the top angle of the sides inclines about 1 foot in 10. If much chalcopryite is to be calcined, or the proportion of chalcopryite to chalcopryite exceeds one half of two-thirds, wood has to be used, otherwise the sulphur itself furnishes the requisite fuel. Fifteen hundred to two thousand hundredweight of the ore is placed in alternate layers from the bottom up, with brush or split wood to insure a sufficient draft. When the kiln is full, the mass is covered tightly with earth. At the back of the kilns, near the top, are holes opening into walled canals, through which the sulphurous fumes pass and are condensed in a large wooden building. The powder so obtained is afterward made into pure sulphur by being refined in kettles. The calcining continues from seven to eight weeks, and must not go too hastily. The odor of sulphur is very perceptible not only in the vicinity of the mine, but at quite a distance from it. No green thing grows near the mine. In fact, the country thereabout has every appearance of having been swept by fire and water. The trees in the town are stunted and grow very slowly. The buildings are dingy and ancient looking. But the town is very healthy. No plague has ever visited it, and in times of pestilence it has often been the asylum of the court. The roasted ore is first crushed to powder, sifted and mixed with common salt, then moistened with a weak solution of sulphuric acid and allowed to stand some time to permit the acid to work. It is then oxidized in a gas furnace, whereby the copper is rendered soluble. The next thing is to dissolve the copper. This is done in large wooden tanks with false bottoms that serve to filter the liquid. Dilute acid, generally that which has been used before, is first introduced over the ore, then stronger acid. The solution is drawn off and precipitated by iron. Scrap iron is the ordinary material, as being cheaper and better than pig iron, and it is used over and over again until no longer serviceable. The precipitated copper is afterward refined in furnaces burning gas made from sawdust and wood. Besides copper, the products, direct and in-

(Continued on Page 5.)

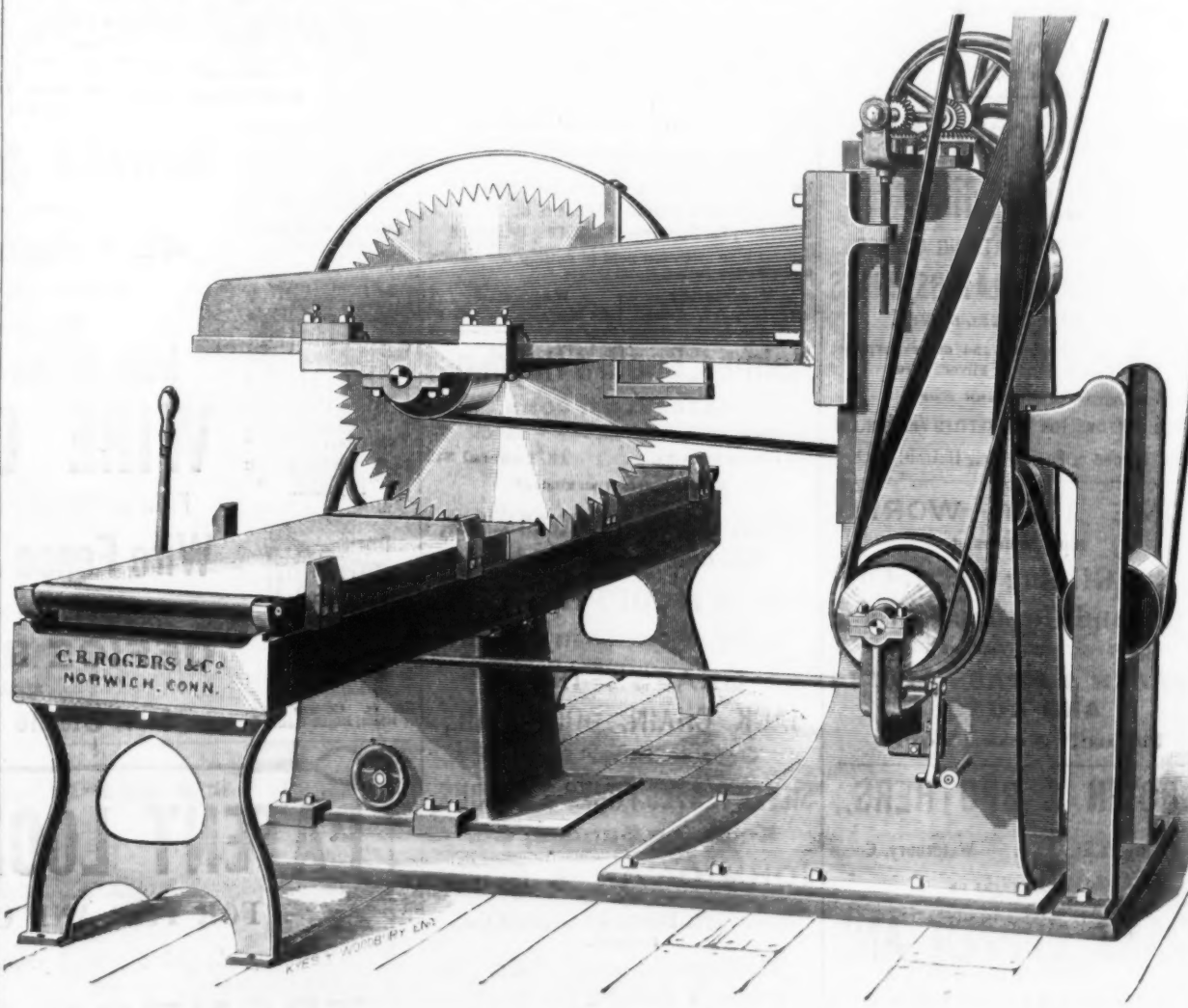


Fig. 1.—Side View of Machine with Saw Attached.

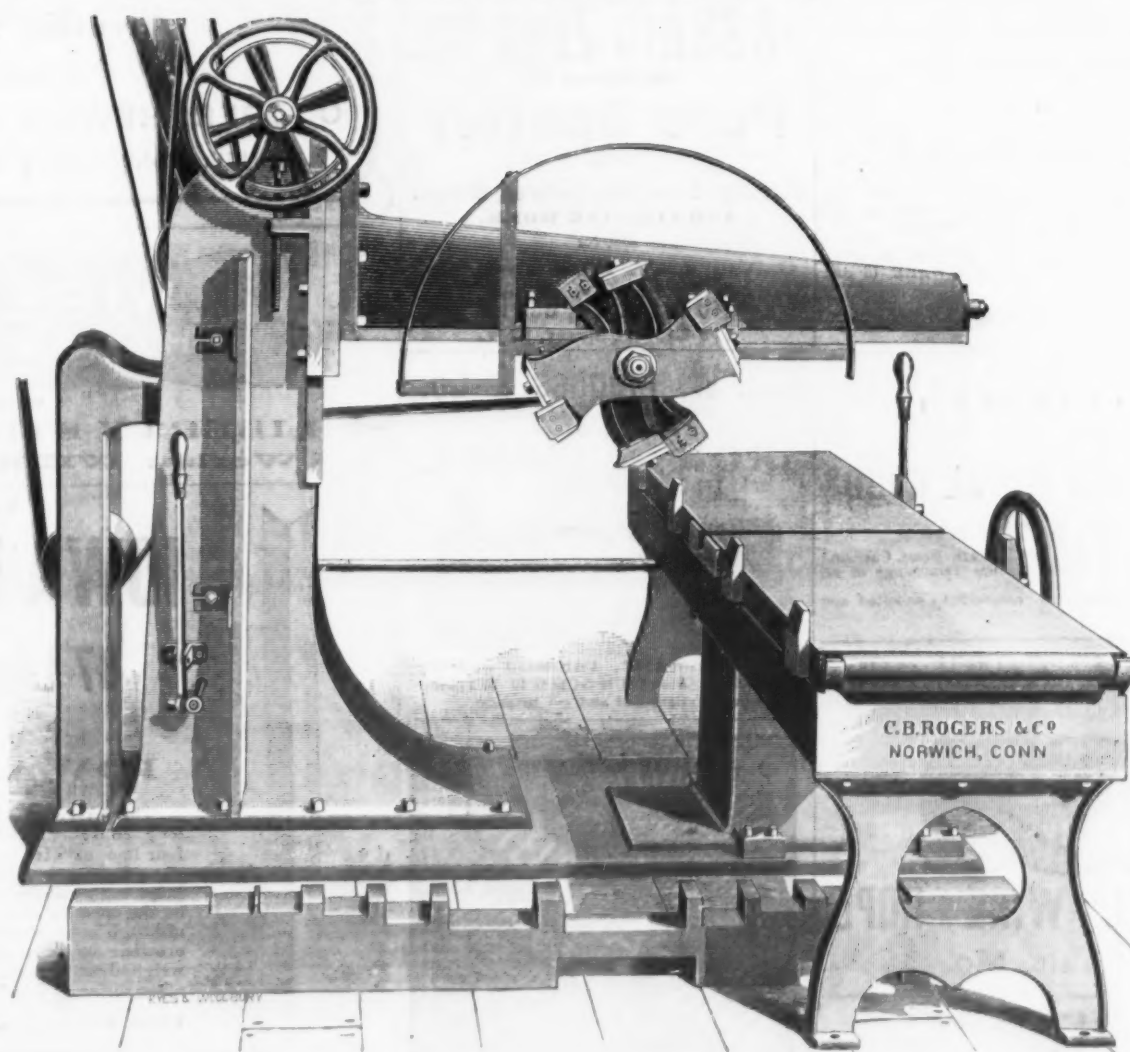


Fig. 2.—Side View Showing Application of Gainer.

CUTTING-OFF SAW AND GAINING MACHINE, BUILT BY C. B. ROGERS & CO., NORWICH, CONN.

in 1280. In 1347 it passed into the hands of the Crown, and there is still preserved a grant of privileges given by King Magnus II (Smek) in the year just mentioned. The sinking of so many shafts by independent bergsmannen finally went so far that in 1647 the ground, fairly honeycombed, gave way, leaving a yawning gulf 1200 feet long, 600 feet wide and 300 feet in depth. The mine

Shafts have been sunk in several places about the pit. The deepest shaft is now sunk somewhat over 1000 feet below the surface. The miners work on two or three levels. Lateral passages extend in several directions from the bottom of the shaft, and through them pass the lines of tramways on which the ore is conveyed to the shaft. A most thorough and systematic method is fol-

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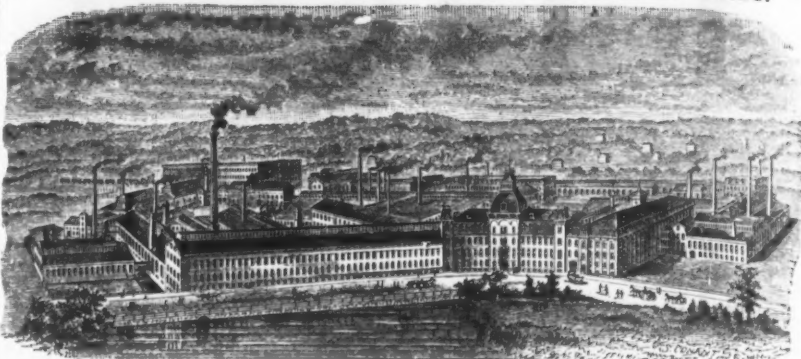
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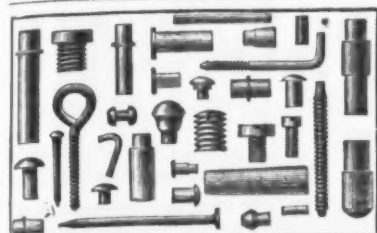
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Silver Ores. Water Analysis for
Manufacturing and Household Use.

Danville Nail and Mfg. Co.
NAILS.
DANVILLE, PA.
JNO L. HOGAN,
IRON COMMISSION MERCHANT,
413 WALNUT ST., PHILADELPHIA.
FOUNDRY, MILL AND BESSEMER
FIG IRON.
Plate, Bar, Railroad and Structural Iron, Spiegeleisen,
Ores, Connellsville Coke. Correspondence solicited.

(Continued from Page 1.)
direct, of the Falun mine are silver, gold,
sulphur, sulphuric acid, red ochre, copperas
and vitriol. The gold, though little in quan-
tity, is made to pay the costs of a large pro-
duction of copperas. The year 1650 saw the
greatest output, amounting to 65,000 cwt.,
or about 3200 tons, of copper. In 1834,
owing to floods and other hindrances, but
little more than 200 tons were realized. In
1878 the mine yielded in the neighborhood
of 700 tons of copper and 22 pounds of
gold. To give some idea of what this Falun
mine has produced during the space of 600
years or more that it has been operated, it
may be remarked that the weight of copper
is estimated at 460,000 tons, representing a
capital of \$175,000,000, and that the value of
the other products amounts to \$3,000,000.
Falun mine is one of the principal copper
mines of Sweden, and by far the most inter-
esting. There are, however, several others
(Atvidaberg, Nya Kopparberg) which now
rival the Falun mine both in the richness of
their ores and in point of production.

SILVER.
Of silver mines, properly so called, Swe-
den has, to Mr. Moen's knowledge, none.
But there are a number of places where
silver bearing ores are found. Prominent
among these latter, and sharing with Falun
the honor of being one of Sweden's oldest
mines, are the extensive works at Sala.
Here, too, tradition has been busily at work
to throw about the operations the glamor of
antiquity. People say that the mine was
known and worked as early as 700. It is
not absolutely certain that any mine was
opened here before the end of the fourteenth
century, while the principal field was not
discovered before 1511. A scientific or even
rational method of breaking out ore was un-
known in the early days of the Sala mines.
It was enough that ore was there and could
be taken out in one way or another. The
work progressed. The miners followed the
vein as it descended at an angle of 45°, or
nearly parallel to the surface of the ground
above. The opening of the mine assumed
almost colossal dimensions, for the breadth
of it finally reached 240 feet. The labor
naturally became both harder and more
dangerous the deeper the excavations were
made. It was difficult to free the mine
from water, which was drawn up in barrels
by horse-power. The ore had to be raised
in much the same way, and there was the
ever-threatening risk of a terrible caving in.
Nothing else could be expected after the way
in which the rock had been broken and under-
mined, for, besides the fact that there was
the unsupported opening just referred to,
subterranean passages had been driven and
no pillars left to bear up the enormous weight
of the mass above.

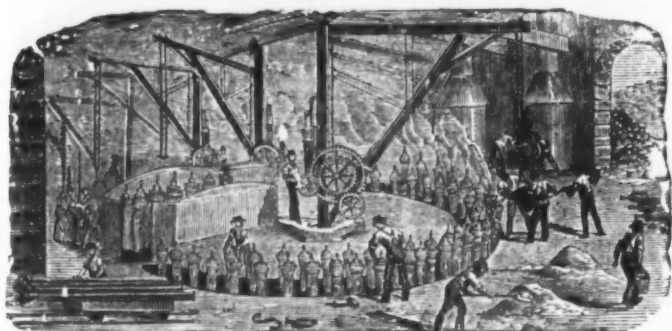
In 1571 two great falls occurred, by which
nearly all the workings were rendered inac-
cessible. Those which could still be reached
were operated only with the greatest dan-
ger. This necessitated Carl IX, the mon-
arch then reigning, to call upon foreign
engineers, who were more at home in min-
ing matters than the natives themselves.
Germans were placed at the head of affairs
at Sala, and improvements, if slow to begin
with, were made not only there, but also at
Falun, and other places as well. A more
orderly system was introduced; closer at-
tention was paid to the future, and as results
there followed increased production, dimin-
ished expenses and fewer accidents. The
Crown, which, during the time of Gustaf
Wasa and the great Gustaf Adolf, had
shown a lively personal interest in mining,
continued to mark with favor all their deal-
ings with the mines from which the State
derived so important a part of its revenue.
Sala was not forgotten, and it remains to-
day one of the most prominent of Swedish
industrial works. Attention should be called
to a curious provision in one of the privi-
leges accorded to the mine, and it may serve
as a type of other not less curious privileges
granted by the Crown to mines and works,
for, however antiquated and useless some
may be, other more important guarantees
are made to depend on them. The
document in question provides that the
owners of the mines shall be furnished, at
the expense of the Government, with the
wood necessary to carry on their operations,
under the condition that it shall all be con-
sumed in the mine itself. This was given at
a time when powder was not in use for the
purpose of driving shafts, as has been ex-
plained, and wood was even then dear and
hard to get. Yet to this day in some por-
tions of the mine the wood is burned as it
was centuries ago, for, were it not, the char-
ter of the mine might be revoked. The Sala
ore is lead glance, or galenite. It occurs in
limestone rock, and is accompanied princi-
pally by copper and other metallic sulphides,
which assist in reducing the lead. Antimony,
nickel and zinc are commonly combined with
the ore. Lead is, of course, the chief prod-
uct. But as the ore contains from 8 to 1
per cent. of silver, the latter metal forms no
inconsiderable part of the return. Roasted
and unroasted ore are treated together in
ordinary furnaces provided with air blast,
and the silver and lead are extracted after
the methods most commonly employed. The
mine at Sala now yields about 2000 pounds
of silver annually, but in years gone by it
has given as high as 6000 or 7000 pounds.

(To be continued.)
Some of the tin-plate houses are at present
in what to the trade generally must appear
the amusing position of sharp rivalry over
the actual weight of coating to each box of
plates. The position is amusing, not because
there is anything comical in the enterprising
presentation of really good plates, but by
contrast with their position only a short
time ago, when almost every house was ear-
nestly searching for something which, on ac-
count of thin coating or for some other
reason, it could sell a little cheaper than
anything its rivals had found. In our edi-
torial on the "Quality of Tin Plates," pub-
lished last week, we mentioned that Messrs.
W. F. Potts & Son claim for their "Old
Process Roofing or Terne Plate" that there
are 5 pounds more metal to each box of 20 x 28
than any other in the market. Now we are
in receipt of a letter written by the Ponty-
mister Tin Plate Works, near Newport,
Monmouthshire, to Messrs. Gummy, Sper-
ing, Ingram & Co., and forwarded by the

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BURLINGTON, N. J.

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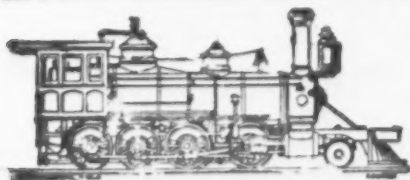
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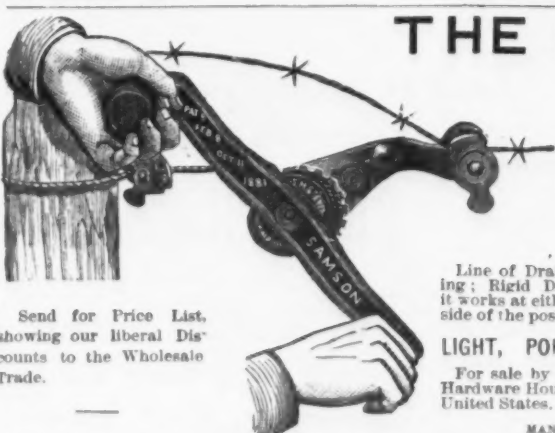
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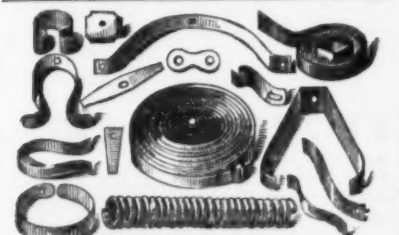
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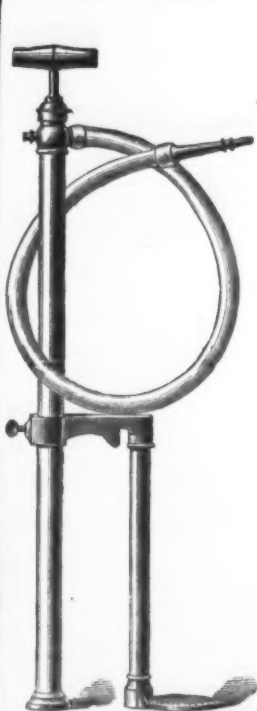


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latter for our perusal, in which the state-
ment is made "that there is on the average
19 pounds of metal upon every box of C
14 x 20, and 38 pounds upon every box of
C 28 x 20, and there is no terne going into
the market that has such a heavy coating."
We cannot, of course, pretend to decide be-
tween these conflicting claims, but the state-
ments are interesting all the same, and should
command the attention of every consumer.
It would seem that no one need hesitate to
buy either of these brands so far as thick-
ness of coating is concerned.

NEW PUBLICATIONS.

INDUSTRIAL EDUCATION IN THE UNITED STATES.
A Special Report by the U. S. Bureau of Educa-
tion. Size, 6 x 9 inches; 320 pages, illustrated.
Pamphlet form.

The report itself covers 77 pages of the
work, the remainder being devoted to appen-
dices of particulars in regard to the various
schools, the condition of education in the
various States, and a mass of other valuable
information is given. Although we have not
yet had time to go through this work with
the thoroughness which it deserves, we have
seen enough of it to be able to say that it ap-
pears to be one of the most satisfactory re-
ports which have been made to the Govern-
ment for some time. It certainly is deserv-
ing of careful attention from manufacturers,
who, of all men, are the most interested in
industrial education. Such an education is
needed in order to furnish material for the
filling of our factories, and, in another sense,
in order to furnish a market for our own in-
dustrial products. It is a curious fact that
in certain parts of the country mechanical
devices are used and freely sold which can-
not, on account of the ignorance of the
people, be disposed of in other countries, or
even in other parts of our own country. The
sewing machine has done wonders toward
educating the public in the use of machinery.
In the same manner the steam engine has
done a vast amount of mechanical education.
One of the chapters which is very interesting
in this work is that devoted to the courses in
the Massachusetts Institute of Technology.
This, like the report from Stevens Institute
and the Washington University, is illustrated.

DETAILS OF MACHINERY. By Francis Campin, C. E.
Wheeler Series: 4 x 7 inches in size; 250 pages,
numerous illustrations. Price, \$1.30.

This work is in some respects deceptive in
the nature of its title, for while it is devoted
to the details of machinery in the fitting shop,
foundry and boiler yard, it is not, as one might
suppose, a book devoted to designing and to
the general work of construction. It treats
at length, in a strictly arithmetical way, of
the method of calculating the strains, sizes of
parts necessary in the various details of
machinery, and also gives arithmetical rules
for solving most of the questions which are
met in ordinary machine designing. There is,
in addition to the mathematical part, a
very considerable amount of matter relating
to forms, sizes, methods of construction and
other incidental matters. It seems a pity
that some of our more experienced and sci-
entific engineers do not produce a book,
based on American practice, similar to this
in character. The sale which it would have
would be very large. Even this work, al-
though largely intended for European use
and founded entirely on English and Con-
tinental practice, will be found very useful by
the mechanical man, and will undoubtedly
be largely sold and used.

RECENT PRACTICE IN MARINE ENGINEERING. In
parts. By William H. Maw. Published by John
Wiley & Sons. Size, 11 x 15 inches, pamphlet
form. Price, \$1 per part.

We have before us parts 4, 5, 6 and 7.
The engines illustrated are mostly reprinted
from *Engineering*. They are given in great
detail, and embrace all classes, from the
heaviest engines for gunboats and ocean
steamers, to the little affairs used in steam
launches and torpedo boats. Everything is
embraced in the scope of the work, from
chain-towage engines to hoisting machines
for steamers. As a record of what has
been and is being done abroad in the way
of marine-engine building, this work is in-
valuable. The material goes back in some
cases as far as 1874-5, and we see that
Mr. Emery's experiments while connected
with the Navy Department, on the Gallatin,
and also, we believe, on the Rush and
Dexter, are given. Many of the engines
present novelties of construction which are
very valuable; others are of interest on
account of being the latest practice of the
best engineering firms. One of the latest
numbers that have come to hand shows the
engines of the Arizona. In many cases the
reading matter accompanying the engrav-
ings is of the greatest interest. Few en-
gineering establishments, whether marine or
otherwise, can afford to be without a work
of this class, since the studies and details
are so suggestive that few engineers can
go through them with any care without
deriving a great deal of benefit from such
examination.

KINEMATICS: A Treatise on the Modifications of
Motions as Affected by the Forms and Modes of
Connections of the Moving Parts of Machines.
By Charles William MacCord, A. M. Size, 6 x 9
inches; 325 pages, 326 illustrations, bound in
cloth. Published by John Wiley & Sons. Price,
\$5.

The somewhat misleading title of this
work does not in any sense impair its value
or its novelty. It treats of many things not
met with in other works on mechanics,
bringing up many problems and showing
successful methods of solution which are not,
so far as we remember, treated either as
simply or as thoroughly as here. The en-
gravings are probably the best which have
appeared in any work of the kind in this
country, and remind one very much of the
engravings in the original editions of Weis-
bach. We can hardly hope to give the
reader a clear idea of the subjects which are
taken up. Among those which will probably
be found of the greatest interest are some
chapters on gearing of various kinds, with
subdivisions covering the manufacture of
gear-cutters, diametrical pitch, path of con-
tact, limiting numbers of teeth, maximum
pitch for given obliquity, computation tables,
&c. The chapter on low-numbered pinions
is one of decided interest, and one could
almost wish that this chapter had been

extended and other forms of gearing con-
sidered. Pin and elliptical gearing, racks,
spur and bevel wheels, and the discussion of
various theories are among some of the
other chapters which we have glanced at
and found full of interest. The chapters on
the hour-glass worm and the Albion and
Hindley worm are very interesting, and we
wish they had been extended. The matter
of the appendix covering the subject of lay-
ing out curves of various kinds and other
kindred matter is very valuable.

Clem & Morse's Safety Elevator Attachment.

The three illustrations which accompany
this article represent a new form of safety
attachment for an elevator which we believe



Clem & Morse's Safety Elevator Attachment.
—Fig. 1.—Side View and Section.

actually does what its name indicates—pro-
vides a safety appliance which will guard
against all accidents arising from the too
sudden dropping of the coach, either by the
running away of the machinery, breaking of
the rope, or other similar accidents. It is made
by Messrs. Clem & Morse, 413 Cherry street,
Philadelphia, Pa. Fig. 1 is a side view

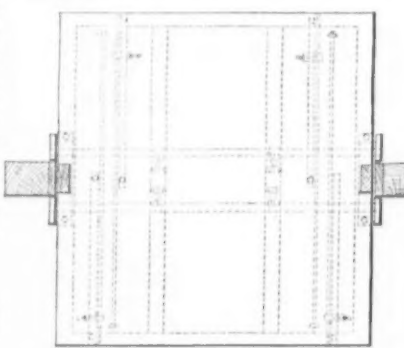


Fig. 2.—Plan.

and section, Fig. 2 a plan, and Fig. 3 a side
view taken at right angles to Fig. 1. The
principle on which the elevator operates is,
we think, somewhat novel. The mechanism
by which the platform is stopped in case the
rope breaks or an excessive speed is reached
consists of a pair of toothed cams, shown in
Fig. 1, which are partly rotated so as to

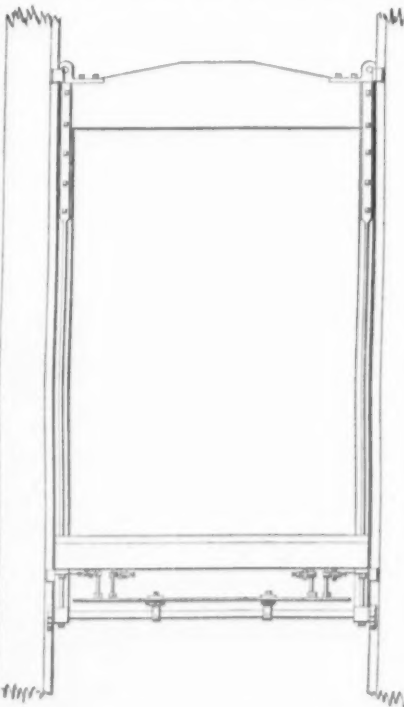


Fig. 3.—Side View Between Guides.

engage in the wooden sides of the guides
and hold the platform at any point. These
are operated by bell cranks, attached, as
shown in Fig. 3, to what may be called a
table. This table is nearly the whole size of
the elevator platform, and is made of 1/2-inch
pine. It is supported on straight steel
springs, shown crossing each other in Fig.
1, and attached to the outer edges. These
springs are so adjusted that the table is
practically without weight, and may be said
to float in the air beneath the platform. If
this table be raised even a short distance, the

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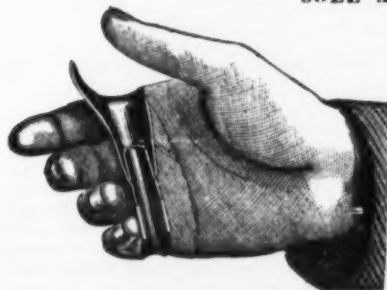
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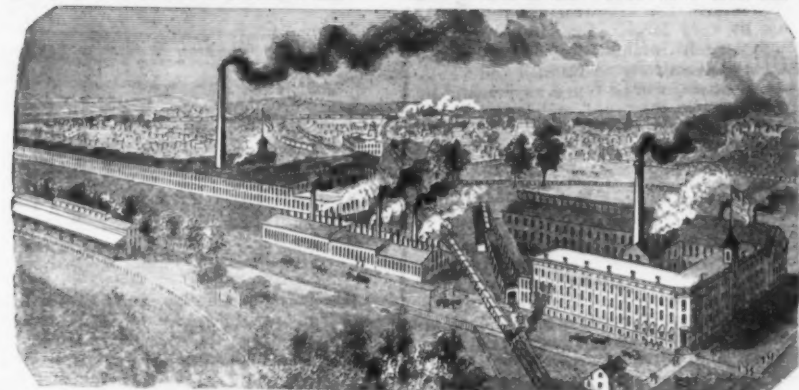
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Half Round Wood,
Hand,
Hand Equaling,
Handsaw Blunt,
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Handsaw Taper, single-cut,
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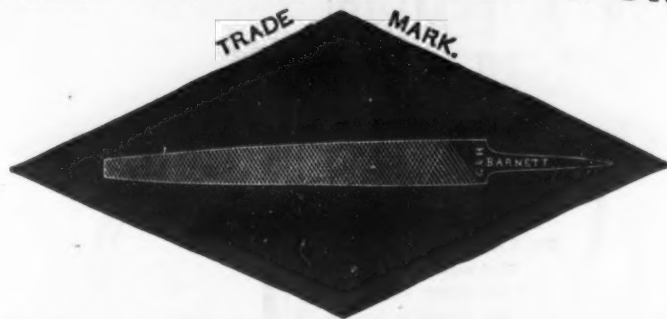
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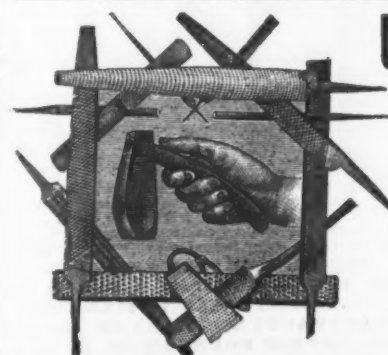
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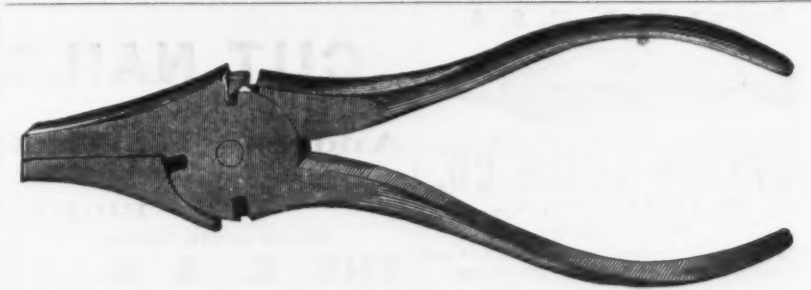
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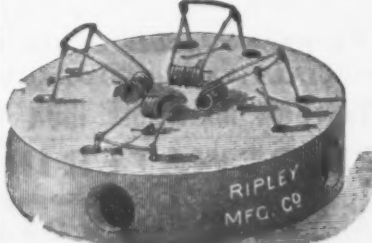
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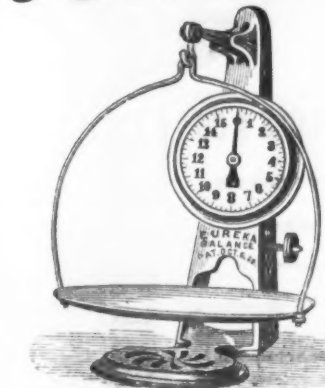
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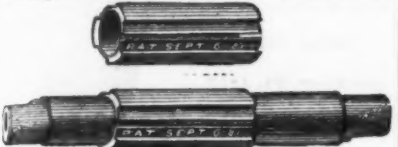


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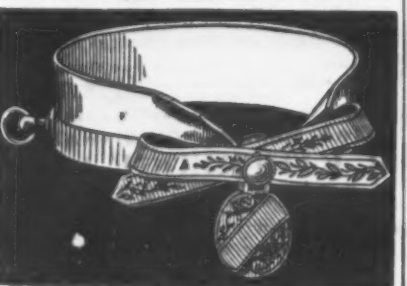


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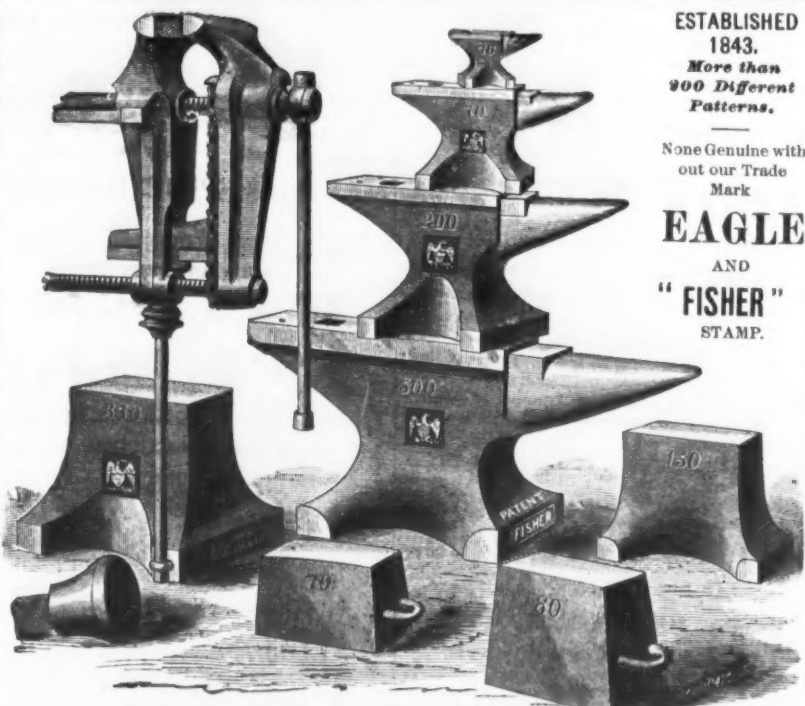
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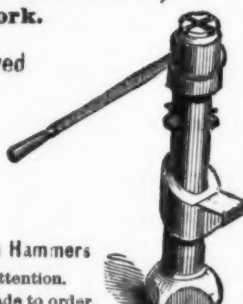
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cogged cams are, by means of the bell cranks, turned so that their teeth catch the guide-posts, and the downward motion of the platform itself forces them in until the motion is entirely arrested. In case the rope breaks or the platform starts downward at a speed above that for which the apparatus is set, the pressure of the air on the floating table forces it upward and the teeth engage, and the main platform is stopped within a space so small that it is scarcely worth measuring. We have seen the rope cast off repeatedly, which was equivalent to a break, and in each case the fall of the platform was altogether too small to be measurable. We have heard of experiments with the apparatus where care was taken to measure the actual distance of the fall, and it was said that the car was arrested within $\frac{1}{4}$ inch of the point where the rope was cut. Whether the car be run loaded or empty, the effect is the same, the teeth taking hold exactly in proportion to the weight on the platform. By adjusting the straight springs which hold the floating table in position, provision may be made for running the elevator at any desired speed or for tripping the gripping mechanism when any given speed has been exceeded. In Messrs. Clem & Morse's own establishment the vertical guides are lined on each side with heavy strips of ash. In the experiments which we have noticed the teeth usually scored the ash for an inconsiderable depth. Of course, with a heavy weight they would be pressed in perhaps $\frac{1}{4}$ inch or more.

The cams on both sides of the car, as will be seen in the plan view, are on one shaft, and near the center are the rock-shaft attachments for turning them. It would seem, from all that we have been able to learn of this apparatus, that it actually provides a device by which safety may be assured, and if attached to a car would prevent injury, not only by actual breakage of a rope, but would prevent those accidents which sometimes take place where the winding machinery gives way, allowing the car to fall, and yet the rope on the drum keeps up a sufficient tension to prevent the gripping devices from acting. It would obviate those cases where the governor rope breaks or fails to act. Messrs. Clem & Morse apply it not only to ordinary freight, but also to passenger elevators of all descriptions. It does not require any considerable alteration of either elevator or guides, the only requirement being that there should be sufficient clearance to enable the toothed cams to get a bearing on the edges of the wooden guides.

The Water Supply of Cities in Ancient Times.

BY WALTER ATLEE, C. E.

(Concluded from page 27, November 1.)

There were very severe laws against those fraudulently turning the water from the aqueducts; fields thus irrigated were confiscated, and the public contractors who permitted the frauds were arrested. Those convicted of willfully impairing the quality of the water were fined 10,000 sesterces (\$280). To insure the execution of this, two citizens in each district were chosen from among the inhabitants or property-holders in the neighborhood to oversee the public water. These laws, which punished so severely offenses which by public opinion were not considered dishonorable, were consequently very efficacious, and must have been very little better than a dead letter, for it would have required but little attention and care to have prevented the aqueducts from being opened and the water turned away, and to have prevented the planting of trees and the building of houses over the underground portions of the channels. Nevertheless, the most scandalous abuses are noted by Frontinus as being customary. In the year of Rome 719 the supply of water became insufficient for the wants of the inhabitants. M. Agrippa, son-in-law of the Emperor Augustus, then holding the office of edile, completely restored the then existing aqueducts, and constructed at his own expense two others—the Julia in the year 719, Roman era, and the Virgo 13 years later. He reorganized and introduced admirable order into the administration of the water supply of Rome, opened a regular account of the receipts and of the distribution of water for public and private concessions; he made laws to insure the preservation of the aqueducts and the maintenance of an abundant supply of water. He made out in detail the amount of water to be distributed to each water tower and from which aqueducts the supplies should be drawn, the quantity to be employed for public use and the amount to be distributed to individuals. He employed and maintained, at his own expense, a family of slaves, consisting of 240 men, for the preservation of the water supply, the care of the aqueducts, water towers and reservoirs. Agrippa, having thus rendered his term of office when edile celebrated for the care he took to increase the water supply by the restoration of the ancient aqueducts and by constructing two new ones, and above all, by the complete reorganization of the administration, so as to insure the preservation of these edifices and the abundant supply of water, was the first to be intrusted with the superintendence of the water supply for life. Those charged with the administration of the water supply of Ancient Rome were chosen from among the most illustrious citizens. Frontinus gives the names of his 17 predecessors, who were all great personages or belonging to illustrious families; men distinguished for military or civic virtues, successful commanders, ex-consuls and other dignitaries, were among those considered worthy and capable of being intrusted with the superintendence of the distribution of water and the preservation of the aqueducts. They alone were held to possess the talents, experience and integrity necessary to properly conduct this most important department of the administration of the Eternal City. Until the death of Agrippa the administration of the water supply of Rome had been regulated by special authority, and was subject to no general law. The Emperor Augustus confirmed by an edict the permits recorded in the registers kept by the order of Agrippa, and having inherited the slaves employed for the preservation of the aqueducts, he donated them to the State. He established the gauges by

which the quantity of water was regulated and limited to 25 the number of openings permissible in each tower. He nominated Messala Corvus to exercise the functions of administrator of the water, and empowered him to make laws regulating the supply. He granted him two assistants, and to them were accorded the same marks of dignity as were given to magistrates. When they exercised their functions outside the walls of the city, they were surrounded by a numerous escort composed of two lictors, three public slaves, an architect for each of them, clerks, messengers, tipstaves and criers equal in number to those accorded to the functionaries who distributed the wheat to the people. When they exercised their functions inside the city the lictors were withdrawn.

We thus see that the dignitary in charge of the maintenance of the water supply of Rome was empowered to exercise force in performing his duties. It was decreed that during the fourth part of the year they were to attend to the public and private demands relating to the distribution of water, but this order fell into disuse, either from the negligence or from the inability of some of the administrators, although the public treasurer continued to pay the tipstaves and other employees, who ought during that time to assist the administrators. The administrators were especially advised to prevent any distribution to individuals without an order from the prince, so that no one might obtain any public water that had not been granted him, nor any one receive more than was conceded to him. This law had been so much neglected that Frontinus tells us "that by enforcing it he would be able, with the quantity of water recovered, to establish new fountains, and to supply new permits of the prince, and that it was necessary at all times to prevent fraud, by an active superintendence; in order to do so successfully, the aqueducts outside of the city should be visited from time to time, and also the water towers and public fountains, to enable the administrator to become acquainted with the nature of the concessions and to insure the flowing of the water night and day without interruption."

Frontinus, in his "De Aque Ducibus Urbis Rome Commentarius," says: "Everything confided to us by the Emperor requires our greatest care, but I feel myself naturally disposed as much by duty as by taste to acquit myself well of the new functions with which the Emperor Nerva, a prince as zealous as well-intentioned for the interests of the Republic, has just charged me in confiding to me the administration of the water of Rome, both for their use and for their purity and safety, a function which has always been exercised by the first citizens of the State. I thought that the best way was to do in this as I have done in other circumstances, in order to well understand the object of my enterprise, and I do not believe, in fact, that there is a surer way to be able to judge well of what should be done and what should not be done, nor is there anything more shameful for an administrator than to act only by the counsels of his agents, which must certainly occur when the chief, from want of experience, is obliged to have recourse to those who should be under his direction, and who, although necessary, ought only to be regarded as the hands and instruments of the administrator. This is why I have followed in several of my other functions, in arranging in order all the information I could obtain concerning this object, united in one body in this commentary to serve me as a guide during my administration."

Those who wished to have a concession of the public water had to obtain permission from the prince by a letter, which, if approved, was presented to the administrator of the water supply. The latter placed the affair in the hands of his assistant, who designated to the guardians of the water tower from which the water was to be drawn the location of the opening to be made, and the size of the gauge to be attached in accordance with the quantity of water conceded. A concession lasted as long as the person or persons lived in the locality for which the water was granted. This right could not be transferred to a purchaser of the locality nor could it be inherited with the property. But the public baths had the perpetual use of the water which had once been accorded to them. These long concessions were rendered necessary by the expense required to conduct the water to the locality to be supplied, often a long distance from the aqueduct, and requiring the construction of a private water tower or reservoir. When a concession became vacant, through the death or removal of the proprietor, it was publicly announced. The administrators had been accustomed to stop the distribution of water immediately on the expiration of a concession, and to sell the right to the new proprietors or to others, but the Emperor Augustus ordered 30 days to be granted, so as not to stop too suddenly so necessary a supply and to give time to make the customary demands for the renewal of the concession. Concessions were afterward made of the surplus water which ran from the reservoirs and from the leakage of the aqueducts. This last was very seldom permitted by the princes, for it was easy to enlarge the fissure so as to supply any quantity of water desired, and this flow aided the rapid destruction of the aqueduct itself.

Frontinus having measured the quantity of water entering the aqueducts, and having ascertained that it greatly exceeded that which was registered as having been employed for public use or granted by concessions, set to work to find by what negligence or fraud this great quantity was lost to the State, and to understand how to prevent it. He tells us that he found gauges of a diameter larger than was permitted by the concessions, some of which were not marked, which proved the dishonesty of the agent who controlled the placing of the gauges, he having been bribed to furnish more water than was justly due. In certain water towers the gauges were of the right size at the opening, but instead of maintaining this diameter for the distance required by law, a larger tube had been attached to the open-

¹ Frontinus, ch. ciii.

² Id. ciii.

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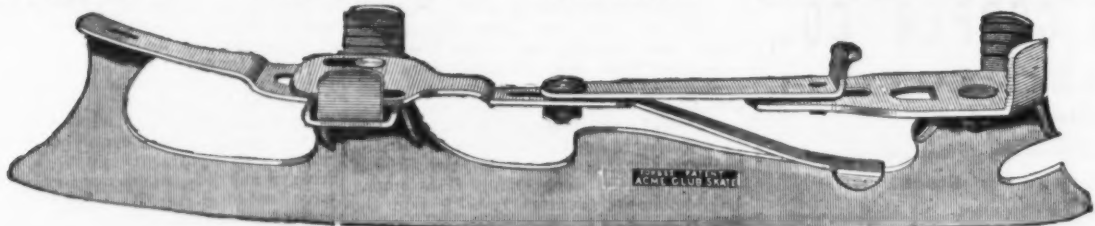
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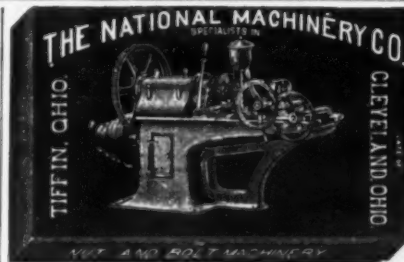
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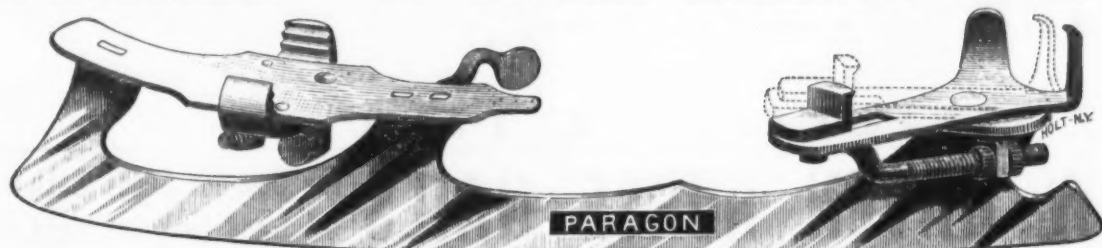
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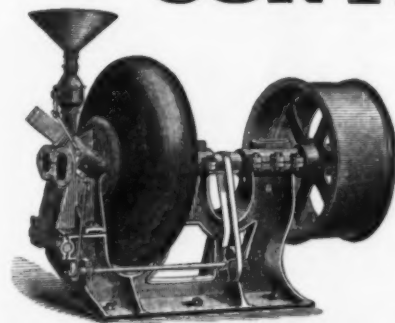
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ing, thus furnishing more water than allotted by the concession as already described. The locations of some of the openings were below those of others; thus, on account of the greater pressure upon the lower openings, they supplied a proportionately greater quantity of water. In several towers, pipes were attached to the openings without any gauge, but were so arranged that they could be enlarged or contracted at the will of the guardian. Another very reprehensible fraud on the part of the guardians was, when a concession changed hands, instead of using the old opening to supply the person obtaining the renewal of the concession, to pierce a new opening and to sell the water from the former for their own interest. Frontinus adds that the suppression of such a fraud should attract the special attention of the administrator of the water, for it is his duty to take care not only of the water, but also of the preservation of the towers, for the latter would be very soon ruined if holes could be arbitrarily pierced. In examining the condition of the different branches of lead pipes placed under the pavements, which circulated throughout the whole city, they were found to be pierced with holes in many places by an instrument called a "pointer;" the water flowing from these holes was sold by the purveyor for his own profit to all those wishing to arrange with him, the water being led from these openings by private tubes to the dwellings. A large quantity of water destined for public use was turned from its legitimate course in this manner, as Frontinus proved by the increased amount received at the outlet of several pipes after the holes had been closed.

The labor required to preserve the aqueducts and to maintain a proper distribution of the water was performed by the men of two families of slaves. One family¹ belonged to the public, having been inherited from Agrippa by his father-in-law, the Emperor Augustus, who gave them to the State as already mentioned. This family comprised about 240 men. The second family, consisting of 460 men, belonged to the family of Caesar, and was established for this purpose by the Emperor Claudius when he built his aqueducts. These men were classified according to the work they were required to perform—into guardians of the water towers, inspectors, pavers, pipe makers and laborers. A certain number of these men were required to live outside the city, in order that they might be able to repair promptly any damage caused by accidents to the aqueducts, for although the damage might be slight at the time of occurrence, the force of the running water would very soon increase very materially any crevice in the masonry through which it might escape, and thus not only delay the supply of water to the city, but destroy the foundations of the aqueduct. Some of the guardians were lodged in the water towers. All the other men dwelt in the vicinity of the water towers and amphitheaters which were supplied with water, and were expected to continually hold themselves in readiness to aid in abating any damage caused by accident, and when necessity required, to aid in directing the supply of water ordinarily running to several districts at once into any special district requiring immediately a more abundant supply.

Frontinus tells us that he found that these men, through the negligence of the overseers, were accustomed to leave the duties required of them for the public good and to work for their own individual profit. To re-establish and keep order among so great a number of men as composed these two families, Frontinus required that the work to be performed on the morrow should be designated the previous evening; he also kept a record of the work performed each day.² These men were paid by the public treasurer, and this expense was defrayed by the money paid for concessions of water. This amounted, in the time of Frontinus, to 250,000 sesterces³ annually; this revenue was often taken for other purposes. The Emperor Domitian used it for his own benefit; Nerva caused it to be returned to the public treasury. The expenses of the supply of water for Imperial properties were paid from the public treasury, as were also those for pipes and all expenses relative to the maintenance of the aqueducts, the water towers and reservoirs, or public fountains. The maintenance of the aqueducts was the especial care of the administrator, for they were exposed to many and frequent causes of damage, which it was necessary to foresee and prevent. Accidents were occasioned by the ravages of age, by exposure to intense cold and heat, by the violence of tempests, through the fault of badly-constructed work, and by the dishonesty of the proprietors of the fields adjoining the aqueducts, who fraudulently caused the water to escape from the channels in order to irrigate their land. Those portions of the aqueducts supported by arcades suffered most from the effects of age and the violence of the mountain storms. Where the arcades crossed the rivers the foundations were much exposed to the violence of the currents in times of floods. The channels in masonry along the flanks of the mountains were exposed to land-slides and many other causes of accident. It was necessary to bring to the execution of all work required to prevent these accidents, and the consequent interruption of the supply of water, great activity, and to have the work performed with great care. The channels underground suffered less, not being exposed to the effects of intense cold or heat. Accidents to the channels could sometimes be repaired, while still maintaining the supply of water, by carrying it across or around the break, through a temporary channel made of lead pipes held at the proper elevation.

A frequent obstruction to the passage of the water was the gradual deposit of mud on the bottom and sides of the channel, which formed in time hard and thick incrustations, and which gradually narrowed the channel till the passage of the water was finally entirely prevented. Sometimes the

mortar would drop out and permit the water to escape, which would damage the walls of the channel and the masonry supporting it. Only those repairs that were absolutely necessary were permitted during the heats of summer, so as not to interrupt the distribution of water at the season when its use was the most required. Spring and autumn were recommended for this work as the season most suitable, when the fresh masonry would not be exposed to the intense cold of winter, which would freeze the mortar before it was "set," nor would it be exposed to the heats of summer, which would absorb the moisture in the mortar and thus prevent it from forming a solid mass with the stones; for intense heat is as injurious as intense cold to fresh mortar. Moreover, there is no work which demands as much skill, precision and care as masonry required to prevent the escape of water; each piece must fit exactly according to the rules which most masons understand and few observe.⁴ By preparing in advance all material required, and working with the greatest celerity, the passage of water was interrupted for the shortest possible period, and by working on but one aqueduct at a time, the city was not deprived of too great a quantity of water at once.

The administrators were empowered by the Senate, when repairs were to be made to the aqueducts, to procure earth, clay, stone, sand and wool from the adjoining fields and have them transported across the fields if necessary, the damages having been previously appraised. Fifteen feet were ordered by the Senate to be reserved on either side of the channels, no buildings or trees being permitted within that space except where the aqueducts were entirely under ground, when the space was reduced to 5 feet. This law had fallen into such disuse that proprietors often inclosed this ground within their fields and used it for their own convenience, building and planting upon it as they pleased, and making roads over it, and even going so far as to prevent the employees of the administrator of the water supply from visiting those portions of the aqueducts, and thus these constructions were, from want of proper and timely attention, gradually destroyed. The real and prime cause of the destruction of the aqueducts was the negligence of the administrators intrusted with the care of the preservation of these magnificent testimonials of the civilization of ancient Rome. The workmen appointed to attend to the repairs, profiting by the negligence and following the examples of their masters, neglected their allotted work and attended to private affairs. Pliny tells us that long before his time the city was deprived of the benefit of the water from the Marcia, the Julia and Virgo aqueducts; that the proprietors of the land adjoining the aqueducts had turned all the water to their own use; nevertheless, the water from these aqueducts continued to figure on the public register as amounting to 22,42 quinaries daily, exactly as if it were regularly received and distributed.⁵

It is evident from what has been said in regard to water supply that modern cities have not advanced beyond ancient Rome; indeed, in regard to abundance, no city has ever yet even contemplated supplying to its inhabitants such a large quantity. There was an abundant supply for every purpose; that which was used for drinking purposes was brought from a great distance, and its freshness was retained by bringing it through conduits of stone and keeping in covered reservoirs, where it was exposed to the action of the air, and at the same time protected from the rays of the sun. Great care was taken to prevent any pollution. As to the abuses in ancient Rome of the public water, it is not the place of the writer, nor his object, to remark upon them, or to make any comparison with those of modern times. Many of the larger cities of both the Old and New World have either recently imitated ancient Rome or are now contemplating so doing, by procuring their supply of water from long distances, from localities removed from all causes of pollution, and bringing it to the inhabitants by means of gravity through aqueducts.

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A number of special machines shown have been illustrated in our columns, and are therefore somewhat familiar to our readers. Draw-

¹ Id., ch. cxv.

² Frontinus, ch. cxiv.

³ It will be remembered that familia (a family), means properly, the servants belonging to a common master.

⁴ Fr., ch. cxix.

⁵ This amount to but \$500 of our money, but the great difference of relative value must be taken into consideration.

¹ Frontinus ch. cx.

² Pliny, lib. 21, ch. xxv.

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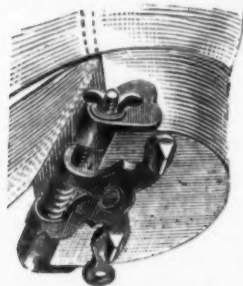
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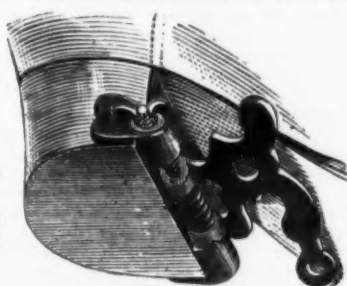


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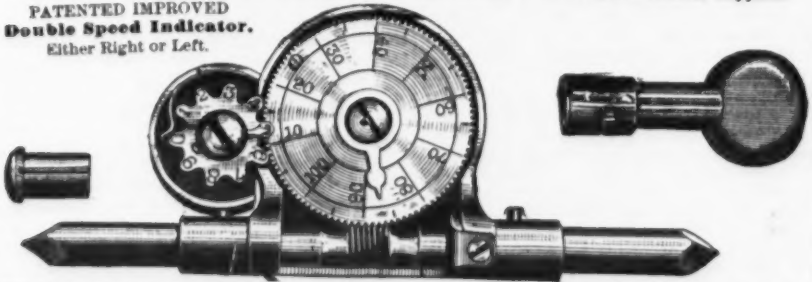
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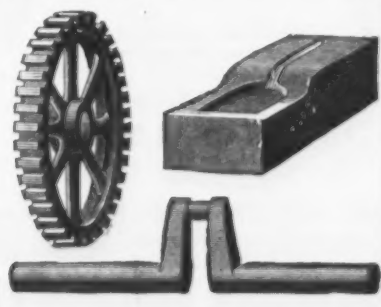
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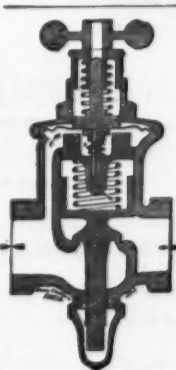
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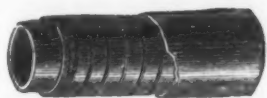
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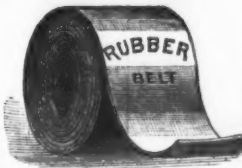
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This company manufactured the immense DRIVING and ELEVATOR BELTS for the Buckingham Elevators at Chicago, which have been running perfectly for more than Twelve Years, also those for the great Elevators of the Penna. and Erie Railroads, of Jersey City and Hoboken, Dow's Stores, of Brooklyn, and many others; in fact, the largest Belts for the largest Elevators in the world.

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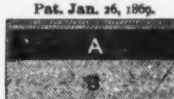
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LARGE WHEELS MADE ON CAST-IRON CENTER IF DESIRED.

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Pat. 11,208, 213,601

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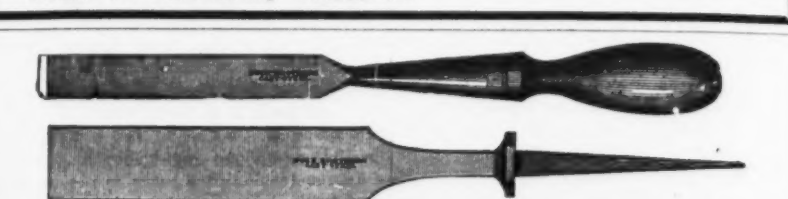
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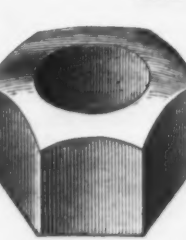
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ing presses are well displayed, a number of cuts of the different forms of this class of tools being included in the work. In connection with these illustrations there is a chapter devoted to the setting of drawing presses. Next follow illustrations of spinning lathes, of which a number are made. In the line of drop presses, almost everything that is wanted is shown, from the bench drop up to the heaviest machine in common use. Lever presses for various lines of work follow, a very complete assortment being given. Upright lever presses, including lever punching presses, are next considered. Circular shears, slitting shears, can-body cutting machines and automatic trimming and squaring machines follow, after which the line of squaring shears made in this establishment is shown. In the latter half of the book a very large number of special machines for doing work are shown. Among these may be mentioned a rotary soldering stove and Howe's patent soldering machine. A considerable amount of technical information is to be found scattered through the book. There is also much that is valuable to those who are about to equip manufacturing establishments for specific purposes. For example, on page 187 there is given an outfit of foot and hand tools for making 2000 standard 5-gallon petroleum cans per day. Following this is a list of machinery and tools for making 5000 cans of the same kind per day. Among other similar items may be mentioned an outfit of machinery for making zinc screw tops, and a line of presses and tools for fruit-can factory outfit. Succeeding these lists are profile sections of fruit-can tops made by combination dies. These are accompanied with prices of the tools required. A prominent feature in the catalogue is a line of cutting dies for pieced tinware, of which a very large assortment is shown. At the close of the book a few machine tools are presented which are somewhat outside of the line to which this factory may be considered devoted. Some new engine lathes and shaping machines of special merit are shown. The catalogue is a model in points of arrangement and typography. It is supplemented by a very complete table of contents, alphabetically arranged. There also appears a list of presses and machines, arranged numerically with reference to the pages of the catalogue where they are described.

Corrugated Iron.

The increasing use for corrugated iron for various purposes offers the opportunity for firms making a specialty of the preparation of iron in this shape to do a large business. One of the handsomest exhibits of corrugated iron which we have had the pleasure of examining in a long time was that made by the Cincinnati Corrugating Company at a recent exposition held in that city. We are now in receipt of a catalogue and pamphlet issued by this concern, descriptive of the work that it is prepared to produce. It is a handsome oblong book, with a tasteful cover, fine paper and handsome letter-press. A red-line border graces every page. The advantages of corrugated iron are first briefly recounted, after which illustrations of the different classes of work made and the different applications of corrugated iron are given. Referring to the general quality of the work turned out by them, they make the statement that to build up their business to its present proportions they have been compelled to raise the standard of its manufacture to the highest perfection in quality of both metal and workmanship. This was fully borne out by the goods shown at the exposition above referred to. They firmly state that they are endeavoring to popularize corrugated iron on its merits, by selling it for general use at prices competing with other kinds of metallic roofing. With reference to the advantages to be derived from the employment of corrugated iron, the statement is made that it will not rattle from expansion and contraction or the effects of the wind; nor is it liable to sag and buckle, causing it to present ugly patches where dust and water settle, as is common to plain iron. Among the illustrations simple sheets are shown; also, curved sheets for use between iron beams in fire-proof construction. A prominent specialty with this company is ridge-capping not unlike that long made by cornice manufacturers for use in connection with slate roofing. This, by means of special wooden ridge pieces, is made to finish corrugated roofs very neatly. Taking the pamphlet as a whole, it is one of the best expositions of the advantages of corrugated iron which we have ever seen.

Steam Jet Pump.

We are in receipt of a pamphlet of some 50 pages issued by Messrs. Van Duzen & Tift, 102 and 104 East Second street, Cincinnati, Ohio, describing Van Duzen's improved steam-jet pump. The manufacturers are offering this device, which is not new in its principles, but rather a successful adaptation of old and well-known principles in a way to accomplish new results, after repeated practical tests which demonstrated its utility. Among the advantages claimed for it are economy in the use of steam, capacity, power, effectiveness and durability. The pamphlet is really a presentation of the advantages of this form of pump over syphons, ejectors and other similar contrivances, and also over jet pumps. Chapters appear on the practical application of the pump, one being on the use of this form of apparatus for pumping water into tanks for manufacturing establishments, and another on pumping liquids of various kinds in chemical works, oil works, breweries, tanneries, paper mills, sugar refineries and the like. A number of illustrations appear, showing the application of the device, with directions for management. At the close of the pamphlet a price list is given, with a record of duty of the different styles of pumps manufactured.

Smokeless Furnace.

Murphy's Iron Works, of Detroit, Mich., send us an illustrated catalogue and circular of their smokeless furnace. The first sentence that strikes our eye produces a favorable impression from its eminent correctness in principle. They say of their furnace that it is not a smoke consumer, but a smoke

prever. It is a self-feeder and has self-shaking grates, by which the clinkers are broken and removed without opening the door. The grates used are inclined toward the center of the fire, and in the setting shown a fire-brick arch forms a combustion chamber just over the fire, so that the hot gases are not cooled in any way until they have been thoroughly burned. The fuel is fine or slack coal, which is put into large hoppers, and this is fed to the inclined grates by automatic means. The pamphlet is an interesting one, and the figures given speak well for the economy of the furnace.

Porch Post Support.

The numerous examples of decay seen at the base of porch posts suggests the use of iron supports, both on account of durability of the parts and for hygienic reasons. Irons



Fig. 1.—Form of Porch Post Iron, with Forked Foot.

are frequently employed in these places, the source of supply ordinarily being the local foundry or blacksmith shop. An improvement over the irons commonly used embodies some convenient means of adjustment, thus making it possible to suit varying conditions and to line up old work after it has sagged. Different varieties of irons embracing these features are being manufactured by the Mount Joy Gray Iron Casting Company, of Mount Joy, Pa., and two styles are illustrated in



Fig. 2.—Porch Post Iron, with Flat Base.

Figs. 1 and 2 of the engravings. The first shows a forked foot, with screw holes, which occupies the least possible space on the porch floor, while the second has a flat base, more suitable for use upon stone piers and in similar positions. In both the weight of the post rests upon a broad flange forming part of the adjusting nut.

The Allard Spiral Screw-Driver.

Herewith we show a spiral screw-driver, manufactured by Mr. F. A. Howard, of Belfast, Me. This screw-driver is designed especially for light and rapid work, and for the use of those mechanics who have large quantities of small screws to drive. For work of this kind it is very valuable, saving many times its cost in a very short time. The peculiar arrangement of parts is such that the screw-driver may be used not only for driving a screw, by pressing against the handle, and thus employing the spiral shank, but it may be also used as a common screw-driver for driving and drawing out screws. In use, the handle is grasped in the right hand, the neck of the shank being held between the thumb and forefinger of the left hand. The point is placed in the nick of the screw, and, while being held, the handle is gently withdrawn. The shank is then released slightly and the handle pressed forward. This causes the screw-driver to revolve, and at once sends the screw home. For withdrawing a screw the shank is pressed into the handle, when it may be used as an ordinary screw-driver. The tool also may be used as a common screw-driver with the shank extended, by simply giving the shank a twisting jerk, which causes the nut to recede and become locked. These goods are sold through the hardware trade, and also sent by mail by the manufacturer.

The duties charged on iron imported into New Zealand are moderate, and many articles, such as bar, rod, bolt iron, screws, castings, iron bridges, iron and steel rails, and all material for the construction of bridges, wharves, jetties, or patent slips, are admitted free, as are all kinds of machinery, steam engines, boilers, &c. Wire fencing, however, is taxed at 1/ (24¢) per cwt., and so are standards, straining posts and apparatus. Gates and gate posts are taxed at 3/ (9¢) per cwt. Corrugated sheets, guttering ridges, spouting, &c., are 2/ (48¢) per cwt.; nails are 2/ (48¢) per cwt.; tanks are 5/ (1.20) each; if of 200 gallons and over the duty is 2/6 (60¢) each. The duty on ironmongery or hardware is 15 per cent. ad valorem. Iron safes are also taxed 15 per cent. ad valorem.

The Iron Age

AND
Metallurgical Review.

New York, Thursday, November 8, 1883.

DAVID WILLIAMS, Publisher and Proprietor.
JAMES C. BAYLES, Editor.
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concerning the effect of this reduction. All agree that it is injurious, if not disastrous. If \$35 or any lower rate prevails, not only will profits be almost wholly swept away, but none save the richest steel-rail companies can continue to do business. If all the mills are kept running under such circumstances, it will only be a question of financial endurance, which will eventually be decided by the sheriff. The other branches of the iron and steel trades cannot regard the course of the steel-rail market with indifference. As the price of rails goes lower, so will other prices sympathetically decline. The fall may not be so great, either absolutely or in proportion, but, nevertheless, the tendency will be in that direction. Not only pig iron, but other iron and steel products, will probably be affected to some extent.

We elsewhere present a report of some interviews which representatives of this paper have held with the agents in this city of some of the leading steel-rail companies. It will be observed that the reduction to \$35 was caused by the failure of the companies to agree to restrict production uniformly. Evidently some of the companies deemed themselves sufficiently well equipped in every respect to compete successfully with their rivals, and therefore determined to secure enough work to keep their mills fully employed. If it had not been for this spirit of combativeness there would have been no contest over comparatively small contracts, for which prices should have been maintained at \$37, in view of the much larger orders which were coming on the market. But now all efforts to sustain prices have failed, and the result is that the companies which can continue to run will compete more sharply for low-priced and profitless business than they ever did for big orders in the days of fat profits.

Troubles of Importers.

The lot of an importer is not altogether a happy one. It seems to be a simple matter, when duties and prices are favorable, to purchase iron or steel abroad, have it shipped to this country, and sell it to somebody who needs it. It is a process as plain and as easily understood as a retail grocer's transactions, apparently depending on the ability to buy at a price which will net a fair profit on the sale. For months and years, when trade is brisk, importers will handle foreign goods in great quantities, and pile up their gains in a manner very aggravating to domestic manufacturers, who would prefer to have the field to themselves. But the importer knows too well, from unpleasant experience, that there are all sorts of trouble-some matters to contend with in the effort to secure business, and when prices are very low it takes unusual caution and vigilance to guard against heavy losses and at the same time continue to buy and sell.

The question of the correct rate of duty is often a very serious matter to an importer who is seeking to do business sanctioned by the law and has no intention of evading its provisions. If the Treasury Department decides a disputed rate within a reasonable time after it is appealed to, there is no harm done; the importer pays the rate fixed, and, if the duty is not prohibitory, he proceeds with his business. But it sometimes happens that months elapse between an appeal and a decision, as in the recent iron wire rod case, and in the meantime nothing can be done. Domestic manufacturers are not benefited, because their customers refuse to buy until they know whether prices will be lower in consequence of a decision in favor of low duties, while importers are injured in being absolutely prevented from making any sales, because they are not sure what duty they will have to pay. Four months were thus lost in the iron wire rod trade during the present year. It occasionally happens that the customs authorities levy a higher rate of duty on an article than the charges obviously intended by the law, claiming that it is something different from what it purports to be. The matter must then be appealed to the Treasury Department, involving considerable delay, and possibly an expenditure for counsel fees.

If an importer appeals from the decision of the Treasury Department to the courts, he undertakes a very serious piece of business. He is obliged to pay the whole duty levied, and sue the Government for recovery of the excess over the rate which he claims to be applicable. He receives the goods and can dispose of them, it is true, but he is in doubt as to their cost until the decision by the court, which may not be made for a year or two after the filing of the protest. If he can sell at a rate to cover the duty he has paid he is very fortunate, but his customers will probably demand a concession in view of the possibility of the court deciding in favor of the lower rate of duty. Such was the cotton-tie case of recent memory. Domestic manufacturers were not benefited by the delay in the legal proceedings, for no cotton ties were purchased from them, but importers were seriously affected, owing to the uncertainty attending their transactions, besides having large sums of money locked up in the possession of the Government until the final decision.

With 3000 miles of water between us and Great Britain, it may be presumed that business cannot always be conducted with ease, celerity and satisfaction. Steamships ply between the two countries very regularly, it is true, and the telegraph furnishes almost immediate communication between the American importer and the European manu-

facturer or shipper, but in spite of these facilities and auxiliaries the course of business is often anything but smooth. We present a case in point. At existing rates it is not profitable to purchase ordinary English pig iron for consumption in the United States and pay the usual freight rate. The low price of American pig iron, conjoined with the duty, cost of insurance and ocean freight, prevents such a commercial undertaking. But if an importer has a customer who desires English pig iron, it is sometimes possible to charter a vessel at a rate which will net a profit of a shilling or so per ton on the transaction. An opportunity of this kind recently presented itself to an importer in this city. The ship, when chartered, was at a west-side Scotch port. The importer contracted with his customer to deliver the iron in October. The vessel sailed for the Northeast of England early in the month to load the iron, but met with an accident on the way, and was obliged to return for repairs. After some delay another vessel was found to take her place. On arriving at the port of shipment, two lighters were sent out to her with the pig iron, but one of them capsized and was sunk with 300 tons on board. The other lighter reached the vessel safely. As no more time could be lost, on account of prior engagements, the ship sailed for New York without waiting for another lot of pig iron to take the place of that which was lost. The iron did not arrive here in October, and the purchaser demanded of the importer \$1 a ton damages for its non-delivery in the specified time. The English shippers, on being apprised of the circumstances, offered to make an allowance of 6d., or 12 cents, per ton, which they thought would be a satisfactory arrangement.

A number of instances have occurred in which importers have suffered serious loss from the shipment to them of pig iron inferior to the kind ordered. In such cases, as the iron is paid for as soon as it is reported shipped, the importer is obliged to pay damages or to take back the iron and sell it for whatever it will bring. His chances of recovering from the foreign shipper are very slim. When times are good and prices are high, and profits are correspondingly expanded, occasional mishaps and afflictions are borne with ease; but when prices are low and business is light, profits are microscopic, and comparatively trifling difficulties seriously interfere with the satisfactory progress of business. Iron and steel importers are therefore decreasing in numbers with the decline of values, and those who are left are anxiously looking forward to the termination of this season of dullness and the reappearance of the brisk times in which they garner their profit.

The National Gun Foundry Board.

The members of the National Gun Foundry Board, consisting of Commodore Simpson, of the United States Navy; General Abbot, of the Engineers; Colonel Baylor, of the Ordnance Department; Major Elder, Captain Mathews and Lieutenant Jacques, returned last week from an extended European tour of inspection of foreign steel works and gun factories. The purpose of their tour was to consider the feasibility of establishing in this country a national gun foundry for heavy ordnance, and make report thereon to the Secretary of War. Woolwich Arsenal, the Sheffield Steel Works, Armstrong's works at Newcastle-on-Tyne, the Hotchkiss Works, near Paris, Terre-Noire and Creusot, the works at Angoulême and near Lyons, were all visited, and a sub-committee consisting of General Abbot, Captain Mathews and Lieutenant Jacques went to Russia to inspect there the Government works at Aboukoff.

As might have been expected, the members were not admitted to the Krupp works, that concern still keeping up the force of making believe that there is yet some secret not known to American manufacturers to be guarded in their establishment. The visit to Woolwich, we presume, was one of mere courtesy—for if the board knew anything at all, they must for a surety have known that the obsolete rattle-traps of that institution could have interest only to antiquarians, but certainly none to those in search of information in regard to the manufacture of modern heavy ordnance. If a national gun foundry is indeed wanted, which we must be permitted to question, Congress would do well to apply to our manufacturers for first information on the subject. There is no question that if the Ordnance Department only knew themselves what they wanted—that is, they were capable of turning out an intelligible steel specification—there could be found plenty of American works to respond to an invitation for bids. "In order to see aright, one must know where to look," and there is no sense in sending abroad a detail of army officers who know absolutely nothing about steel manufacture to study foreign practice before they know anything about American practice. The report of this board will be looked for with peculiar interest by our manufacturers, and as it may be given to Congress before the steel practice of the world is entirely changed again, we may yet have an opportunity to lay the document before our readers.

Four cars on the Brooklyn Bridge were damaged last Saturday by a collision at the New York terminus. At that time trains of two cars each were running at three-minute intervals. There was the usual trouble about

the "grip" of the train which was about to start from New York. The train from Brooklyn came in and was run on the switch; the clearance not being sufficient, the rear platform of the last car projected, so that when the following train came in it was struck by the forward car and driven ahead on the track. The platform was broken into splinters, pieces of iron and glass flying in all directions. The rear brake-wheel of the stationary car was badly broken and the iron rails twisted. The blame for the collision is now thrown on the conductor of the telescoping train, who, however, claims that the brakes did not work, and that he was unable to release the grip from the rear car, which pushed the forward car upon the standing train. Luckily, nobody was seriously injured, and the trains were delayed about half an hour. We have thus far abstained from any remarks in reference to the bungling work in the construction and fitting up of the grip machinery and the laying out of the switches on the termini of the bridge. The incompetency displayed in this work has been so phenomenal that it could scarcely be considered a proper subject of scientific criticism. Now, however, when it is evident that this combination of blunders is endangering the lives of passengers, we desire, in a thoroughly friendly spirit, to call Colonel Paine's attention to the fact that there is a point at which mistakes of this character invite, and are likely to receive, consideration by the Grand Jury.

Valuation of British Steel.

The Sheffield correspondent of the London *Ironmonger* for October 13 makes the following remarks concerning British exports of steel from Sheffield to the United States:

How the aspect of the steel trade with our Transatlantic customers has changed within the last two years may be gathered from the fact that, while in 1881 the average value of the steel shipped to American ports was something like \$3 per ton only, during the present year it is nearly \$28 per ton. The average value of the great bulk of the cast steel shipped to the States may be taken to range from \$40 to \$50 per ton, so that some idea may be obtained of the quantity of Bessemer being sent now as compared with two years since.

Inasmuch as our new tariff has changed the method of levying duties on low-priced steel from specific to ad valorem rates, this statement has suggested to us a comparison of the average value of the total exports of British steel to this country for the first nine months of the present year with the average value of the exports in September, for the purpose of ascertaining whether there is any indication of the undervaluation which our manufacturers feared would be the result of the new duties. In the nine months referred to the exports were 25,564 tons, valued at \$383,148, which is an average of about \$15 per ton. In the month of September the exports were 966 tons, valued at \$26,980, which is an average of about \$28 per ton, or almost double the average value for the nine months. Of course, these figures are not to be relied upon except for the general inference, as they cover blooms, and, possibly, rail ends and scrap steel, as well as crucible steel. Details of the values of the crucible steel alone might show a somewhat different result. But there is not in these figures the slightest indication that sweeping undervaluations are being made. If there was any systematic effort of that character it is reasonable to suppose that the British figures would be manipulated as well as those which are reported to our custom houses.

The comparison we have made also shows that the British steel sent to this country is now being restricted to the better—and, therefore, higher-priced—qualities. Ordinary Bessemer and open-hearth steels are being shut out of this market, as, if they were not, the average value would be much lower than \$28.

Officers and Gentlemen.

There is a very general opinion among mechanical engineers that there is an "original vacancy" to be filled in the faculty of the United States Military Academy at West Point—the chair of Courtesy and Good Manners. By the army regulations officers are presumed to be gentlemen, and their conduct is considered reprehensible only when it is "unbecoming an officer and a gentleman." We regret to say, however, that within the past week the Commandant at West Point has given a conspicuous illustration of the fact that a man may be an army officer without at all times doing what would be expected of a gentleman in civil life.

The facts of the case are briefly these: The committee having in charge the arrangements for the late meeting of the American Society of Mechanical Engineers planned a pleasant excursion over the West Shore road to Kingston and return. As West Point was to be twice passed, it was thought that a brief stop to afford the members a chance to look at the museum and library would be pleasant. They were told, however, that permission would be necessary, and a polite note was written to the Commandant, requesting that such permission be extended. Meantime the management of the West Shore road had arranged the time-table for the special train, providing for a stop of one hour at West Point on the return trip. On Thursday last a curt letter was received from the Commandant, refusing the permission asked for, on the ground that the visit of so large a body of excursionists would seriously demoralize the cadets and interfere with their studies. The plan was then dropped, and

the Superintendent of Motive Power of the West Shore road, who had arranged the excursion, was asked to give the party the benefit of the hour that was to have been spent at West Point, by bringing them back to New York that much earlier. He replied that he could not rearrange his time-table, but that he had secured from the Commandant at West Point the necessary permission for the party to stop, as originally intended.

When West Point was reached on the return run from Kingston, the promised stop was made. All but a few of the excursionists left the cars and wandered around in a purposeless way. There was no one at the station to meet or conduct them, and not one representative of the United States Military Academy made his appearance. Not knowing where to go, they straggled back to the cars and sat out the hour of waiting with as much patience as could be expected under the circumstances. Considering the fact that this is a society of national importance, and that its membership includes gentlemen of the highest professional standing, it must be admitted that they received very shabby treatment at the hands of the "officers and gentlemen" of West Point. Such a letter as was sent their committee is what might be expected in the way of a stereotyped reply to like requests on behalf of average Sunday-school picnics, but it was very different from what the American Society of Mechanical Engineers had a right to expect, and to ignore the party after according permission to stop the train was even more an offense against good taste than the refusal of permission would have been. Considering the eagerness of army officers to appropriate and monopolize the testing machine which one of the members of this society designed and built, it would have detracted nothing from the dignity of the "officers and gentlemen" of West Point to have treated the society with common civility. Should any of them see fit to attend a meeting of the society, with or without invitation, we can promise them a chance to see what the members consider conduct becoming engineers and gentlemen.

Course of the Tin Plate Markets.

Strange to say, although everything seems to favor the position of tin plates just now, the course of prices has been a great disappointment to holders for a month or two past. The demand has been good—sufficiently so to easily absorb the ample importation and leave us with light stocks in port; yet prices have shown little strength, in spite of their being well upheld in Wales and Liverpool, and notwithstanding the well-known fact that makers in Wales have their hands full to cope with the growing demand from all quarters, which promises to suffer little or no abatement for months to come at ruling prices. Our import during the first seven months was as under:

	1883.	1882.
Import.....	288,051,619	289,348,288
Less re-export.....	2,350,954	2,169,344
Net import.....	285,700,665	287,178,944
Equal to tons.....	137,571	138,147

The demand for tin plates for building purposes has been brisk all along, and is still favored by a fine, mild fall. The fruit-canning trade has been equally lively, there having been a great abundance of those fruits usually put up in cans. An approximate estimate of what the canning trade in our inter-State traffic must have been is afforded by a statement of the export of canned goods for the first seven months of 1882 and 1883, which we append:

EXPORT OF DOMESTIC CANNED GOODS AND TINS.		
	1883.	1882.
Blackening.....	\$121,898	\$104,250
Prepared cocoa.....	49,218	59,580
Canned salmon.....	490,145	—
Canned oysters.....	368,491	379,133
Canned fruit.....	263,250	263,948
Gunpowder.....	3,868	221,619
Honey.....	21,406	34,475
Petroleum.....	22,344,040	23,063,330
Linseed oil.....	30,756	30,445
Canned beef.....	2,266,068	2,391,726
Lard.....	17,122,801	16,482,564
Spirits of turpentine.....	2,348,237	2,374,120
Tinware.....	127,988	134,968
Varnish.....	100,054	108,054
Canned vegetables.....	82,574	94,967
Total.....	\$45,975,883	\$46,500,001

On taking a general view of the outlook, we are led to the conclusion that tin plates are in an unusually sound position. The disinclination the article has lately shown to improve in value in the American market is, we believe, mainly due to the competition among importers and the great distribution among small receivers, not only at the ports, but even in the West on through bills of lading—in other words, the split-up character of the trade, aggravated by the eagerness of some big concerns at the ports to undersell one another. But for these irregularities and incongruities in the relations between Liverpool and our chief centers of distribution, the ruling would probably be more in accordance with the actual facts underlying the situation, which certainly seem favorable enough.

The Miantonomah Armor-Plate Contracts.

On the 1st of October last bids were opened at the Navy Department in Washington for compound armor-plates for the turret and pilot-house of the monitor *Miantonomah*.

other from Messrs. William H. Wallace & Co., of this city, representatives of John Brown & Co. and Charles Cammell & Co., of England. The contract was awarded to Messrs. Wallace & Co., at £110 per ton, exclusive of duty, an 11½-inch test plate to be first delivered at New York, and, if satisfactory, the contract to be completed by supplying the required number of plates of the same quality. The contract is not a large one, except in the single particular of the size of the plates, most of which are very large and heavy. The largest are over a foot thick, about 6 feet wide, from 15 to 18 feet long, and will separately weigh as much as 20 tons.

The Navy Department is not a subject of criticism for having placed this contract abroad, as none of the steel works in this country possess the appliances for the manufacture of plates of this size. Messrs. Wallace & Co. are well-known and highly-esteemed merchants of this city, who have for years represented such firms as Henry Burden & Son, Charles L. Bailey & Co., the Central Iron Works, &c. They are not importers or agents of foreign manufacturers, in the ordinary sense of the terms, and not in this matter for the best interests of the Government, as well as their own individual interests. Of course, Congress may well be criticised, and even severely criticised, for not making adequate provision for the manufacture in this country of steel armor-plates, steel guns and all other necessary paraphernalia for war, but it does not seem possible to secure a majority of that body to favor a policy which will put this country on an even footing with the first-class powers of the world in matters relating to war, whether it be for offensive or defensive purposes. A beginning has, it is true, been made toward the rehabilitation of the navy, but it remains to be seen whether the next Congress will proceed further in that direction, or whether it will not, from partisan motives, obstruct the movement and interpose more years of delay before the navy of the United States will be worthy of mention among the navies of the world. The highest patriotic motives should animate all of our representatives who have anything to do with these matters, while party economy and blind partisan bias should both be overwhelmingly condemned when arrayed in opposition to national progress.

The Decline in the Price of Steel Rails.

Believing that our readers would be interested in the facts connected with the recent abrupt and serious tumble in the price of steel rails, we herewith present a report of some interviews which representatives of this paper have held with leading members of the steel-rail trade, in which will be found explanations of the causes of the decline, and opinions upon its extent and effect.

The first gentleman called on was Mr. B. G. Clarke, of the Lackawanna Iron and Coal Company, with whom the following conversation had:

"Is it true that you have sold 30,000 tons of steel rails at \$35?"

"Yes. We have sold them at that rate for winter delivery. We do not propose to sell any more at that rate, and do not think we will have to. That fills us up for the winter, and prices will then, we think, be able to take care of themselves."

"Was this low sale the result of competition, or did you think the time had come for lower prices to be named?"

"We found that all the efforts to sustain prices at \$37 were destined to fail. All sorts of plans were tried to get the various companies to agree to uniformly restrict their production, but none would work. One company caused all the trouble. We then found that other companies were taking orders at \$35, and we concluded to do the same."

"Was the failure to agree upon restriction caused by an Eastern or a Western steel-rail company?"

"It was the fault of an Eastern concern. I tried my best to fix up matters satisfactorily, but it was of no use."

"What will be the result of the failure of efforts to sustain prices and the fixing of the thirty-five dollar rate?"

"It will lead to very severe competition, and the end will be 'the survival of the fittest.'"

"What effect do you think this will have on the other companies?"

"They will all have to sell at the same price; they cannot maintain their price at \$37; they get \$37 for some lots, but they could not get it except in a small way. The large orders are being held in abeyance until prices are fixed. The Pennsylvania Railroad Company, for instance, want 65,000 tons of rails; they would not buy until prices got down to hard pan."

"Do you think this reduction in the price of rails will make any difference in the price of pig iron?"

"No, I think not. My impressions are that pig iron is down to hard pan. In fact, I think there are enough furnaces stopped now to hold prices where they are. Stocks are being reduced all the time, and there is no object at all to cut prices. We shipped more pig iron from Hoboken last month than we ever have before, and we have been increasing right along for months. Our stock at the furnace has decreased 7000 tons in the last two or three months."

"Do you think this reduction of steel-rail prices to \$35 per ton will be about the lowest?"

"I should say so. I should hardly think steel rails would go any lower than \$35. We do not care to take any more orders; only just sufficient to keep us running through the winter. Well-organized concerns can just about live now. They are not paying any great dividends, but they will not break if they are well organized."

Mr. George A. Evans, sales agent for the Bethlehem Iron Company, was next interviewed. Mr. Evans was asked whether he

had heard of the sales of steel rails at \$35 per ton. "It is really a fact that there have been sales of rails at \$35 a ton. I do not want to sell any at that rate, however. There are really more selling at \$37 than at \$35. I have not sold any at \$35. I think, though, that \$35 is low enough to go. Of course, if we wanted to sell any rails, we could only get \$35. We are not pushing any work. If any steel-rail concerns want to put in orders for next year they have got to come down to \$35."

"Have you any idea what the immediate occasion of the decline was?"

"There was a pretty decided feeling that rails were being sold by several parties at low rates. Mr. Clarke did not make the first reduction. You cannot find out who did it."

"In other words, Mr. Clarke announced openly what others were doing quietly?"

"That is it; certainly."

Mr. C. H. Odell, sales agent of the Pittsburgh Bessemer Steel Company, Limited, was then visited, and the following brief conversation ensued:

"What do you think of this reduction of the price of rails from \$37 to \$35?"

"I think it is a disgustingly low price. I think every railroad in the country would have paid \$37 just as cheerfully as they would \$35."

"If this thirty-five dollar rate is generally established, what effect will it have on the mills? Do you think that the mills will all load up, or will they hold off for higher prices?"

"In relation to that, I want to say right here that I do not think they will sell one ton more of rails at even \$30 than they would at \$38. That is my honest conviction."

"That is, you think the low price will not stimulate the demand?"

"It will not. There is just so much business that will be done; putting the price down will not help it one bit. It will create a feeling of distrust among moneyed men, and you will find the lower the price of rails the more difficult it will always be to get men to put their money into new enterprises or build new work. In other words, the cheaper you can build a railroad the more difficult it will be to get the money to build with."

A gentleman connected with a very prominent steel-rail company was then seen, but, while he gave his opinion freely upon the general situation, he desired his name withheld. He said:

"In relation to the possibility of lower figures, it would be difficult for rails to remain at a price below cost, and the cost price is something that is hard to get at. It is necessary to know how costs are made up—what constitute the items of cost. Of course, the principal items are stock and labor. Then there are the expenses and other items, some of which one concern might put in and another leave out; and to make up the cost a person must know all these, and that is rather difficult, as it is a private matter. Whether \$35 will be considered a standard price no one can tell. I do not believe that any of the mills will be inclined to run at a loss. Of course, before doing that they will reduce production. The object of running will be to keep their organization, and to keep that together they will run at as low a cost as possible. Undoubtedly a great many rails will be contracted for within the next month, but it takes a great number to fill all the mills. Prices now are in such a transition state that I do not think any one can tell the result."

"Has this fixing of \$35 been a sudden drop, or has \$37 been shaded secretly for some time?"

"If rails have been sold for \$35, and I do not really know that they have, I do not believe that any have been sold for any difference between \$37 and \$35."

"Other mills will, however, be obliged to meet this low rate, will they not?"

"Well, that depends upon whether or not there are a good many orders to get out. If they are now filled up, I don't believe there would be any disposition to come down."

"You say that you have not really heard of sales at \$35. Was not the large sale recently announced made at that rate?"

"I have understood that the price was not named. It was simply a guarantee to meet the market. That is the way I understood the sale."

Another gentleman connected with a steel-rail company said that the most peculiar feature of this reduction in price is that it was not brought about by competition for very large orders, as might be supposed, but it was caused by a contest in which a very few of the companies were concerned. The quarrel, if such it may be called, resulted in the offering of rails considerably below the market price, until \$35 was named. After this rate had been fixed in the transaction referred to, it was followed in other instances by other companies until it became an open price.

Natural Gas in the Edgar Thomson Steel Works.

The Pittsburgh Dispatch says: "This week the experiment will be made of operating the Bessemer Steel Works at Braddock by the use of natural gas as fuel. The work of laying the pipes from the Murraysville well to the works has been pushed forward rapidly and is almost complete. Some little delay was occasioned, owing to the objection of the Pennsylvania Railroad Company to the laying of the pipes under their tracks, but it is understood that this obstacle has been overcome, and that the work is now in such an advanced state that connection will be made with the boilers of the works within a few days. The establishment has in use 100 boilers, which are to be heated by means of the natural gas which flows from one of the best wells at Murraysville. It is thought that if the experiment proves a success it will cause a revolution in the use of natural gas as fuel. Thus far no attempt has been made to operate an establishment of such gigantic proportions as the Edgar Thomson works with natural gas, which fact attaches considerable interest and importance to the experiment. Should it prove a success, it is said that the Bessemer Association, which controls all the Bessemer works in the United States, may adopt the same system of heating at other works wherever feasible. The company making the experiment is composed of John Doubleday, George Boulton, John Hoffman and other well-known operators in the oil regions."

SCIENTIFIC AND TECHNICAL.

A New Mineral.

MM. G. Cesaro and G. Despret have given the name "richellite" to a supposed new mineral from Richelle, in the neighborhood of Visé, Belgium. It occurs in compact masses which have a cream-yellow color, becoming other yellow on alteration. Its luster is greasy or resinous to earthy, and its hardness varies between 2 and 3, the specific gravity being 2. An analysis gave the following results:

P ₂ O ₅	Fe ₂ O ₃	Al ₂ O ₃	CaO	Ignition.
28.97	28.71	1.80	0.64	35.54 = 100.36

At 100° the mineral loses 23.33 per cent. water, and at a red heat 6.10 water and 6.11 hydro-fluoric acid. MM. Cesaro and Despret leave the composition of the mineral in doubt, but regard it as a fluo-phosphate of iron and calcium, the fluorine being, in their view, in combination with the iron; the microscopic examination which they propose to make will, perhaps, throw some light upon the subject.

The Fire Risks of Electric Lighting.

In a paper read at the recent meeting of the British Association, Mr. Killingworth Hedges remarked that there is a great difference between the electric currents which have been in constant use for telegraphic purposes and those which are to be supplied by the undertakers under the British Electric Lighting Act. The latter can only be said to be free from danger when the heat generated by the current is utilized in its right place, and not developed in the conductors or wires which lead the electricity to the incandescent lamps. The British Fire Risk Committee have already issued rules for the guidance of users of electric light; these can hardly be said to embrace all the salient points of the new subject, which can only be arrived at after years of practical work. The conductors must be properly proportioned for the current they have to carry; whatever resistance there is in the conductor will cause a corresponding development of heat, which will vary with the amount of electricity passing, and inversely as the sectional area. The material must be free from impurity, otherwise an impure section will increase the resistance. The extraordinary difference in the connecting power of a sample of "commercial" Rio Tinto copper wire, as compared with the pure metal, was shown in an experiment by Dr. Matthiessen—the conducting power being only 13.6, as against 99.95 for pure copper. The continued heating of an impure metallic conductor has a certain effect on its electrical resistance. With the sample just mentioned, the conducting power at 100° C. decreased from 13.58 to 13.55 after the wire had been heated for three days. It does not always follow that there will be a decrease in the conducting power, as with alloys the opposite effect is produced. A copper-silver alloy showed an increase of .264, after having been heated to 100° C. for three days, and a tin-copper alloy an increase of .13.

As the temperature in Dr. Matthiessen's experiments was not increased over 100° C., the author has made some further experiments—heating the wires by the electric current from a secondary battery to within a few degrees of their melting point. The following materials were tried, the wires and foils having such sectional area, and so arranged that, on the current being increased by 20 per cent., they were immediately fused. The total length of each experiment was 24 hours, during which time the current passing through varied slightly, and the following is a mean of the results:

Material.	Resistance heating.	Resistance of leads.	Difference after 24 hours.
No. 1. Commercial tin wire.	.815	.8	— .015
No. 2. Lead, soft.	.835	.8	— .035
No. 3. Copper, soft.	.81	.8	no change
No. 4. Pure tin foil.	.86	.8	no change
No. 5. Tin and lead alloy.	.87	.8	— .010
No. 6. Albo alloy, in foil.	.835	.8	no change
No. 7. Aluminum and tin alloy.	.82	.8	+ .008

The resistances were in all cases taken at the temperature of the air, which averaged 69°. The sign — shows that the metal decreased in resistance and + that it increased after continued heating. Nos. 1 and 3, tin and copper, were found to scale when heated. A change has been noticed where high tension currents have been sent through a pure copper wire for some time—the wire in the armature of a Siemens machine, which came under the notice of the author, appeared to be brittle, and gave a fracture unlike pure copper. The necessity of good electrical connections is very great, also special arrangements of switches and contact breakers, which, when left in unskilled hands, are liable to cause dangerous heating or an arc. Short circuit is the danger which may be caused by badly-arranged wires; most likely a conflagration will ensue unless the remedy suggested by the British Fire Risk Committee and the Board of Trade is adopted—of having a cut-out or fusible plug in the circuit, which gives way when the current is in excess. These should be arranged to melt if the current is more than 10 or 15 per cent. of the working strength, otherwise absolute safety is not arrived at. Ordinary lead or tin wire cannot be used except for very small currents, as, on fusing, the metal is scattered in a globular form, when it is liable to cause fire. The plan adopted by Mr. Hedges is to take pieces of foil arranged like the leaves of a book; the thinness of the foil causes it to be almost volatilized when melted. The material found to be the most reliable is a special alloy of aluminum, termed Albo metal, which is extremely tough, and can be worked much nearer to its fusing point than tin or lead. The safety of an electric-light installation is only insured by testing, which should be done by a current of higher electromotive force than it is intended to use.

Radiation of Silver at the Moment of Solidifying.

At the International Electrical Congress, in 1881, J. Violle proposed an absolute photometric standard the radiation of a square centimeter of melted platinum. Dumas approved of the proposal, and at his invitation Violle performed some preliminary experiments with silver. From the moment when solidification begins, in contact with the containing vessel, until the whole becomes solidified, the radiation of the liquid part remains constant. The constant portion of the radiation is so sharply defined that silver may furnish a secondary fixed standard, which will be especially convenient in all the measurements of spectro-photometry.

Astronomical Observations at High Altitudes.

Astronomical experiments conducted at various heights in Peru and Bolivia during the first half of this year yielded some interesting results. At La Paz (elevation 12,000 feet) Mr. Ralph Copeland, under whose supervision the observations were made, saw stars that are with difficulty seen in Europe with artificial aid with the naked eye, notwithstanding the light of the full moon. At Puno (12,500 feet), Canopus, Sirius and Jupiter were visible to unaided vision from 1 to 25 minutes before sunset. A number of small planetary nebulae and stars, with very remarkable spectra, were found in the southern part of the Milky Way, by searching with a prism attached to a 6-inch telescope on Professor Pickering's plan. The most remarkable stars showed spectra of little more than two bright lines, which Mr. Copeland had observed in the spectra of various nebulae. Several close double stars were discovered. At Vincocaya (14,360 feet) the solar spectrum was very much increased in brightness at the violet end. At Arequipa (7500 feet) the relative humidity of the air was as low as 20 per cent., and not much higher at other stations. Mr. Copeland believed that an observatory might be maintained with great facility at a height of between 9000 and 12,000 feet, the night temperature being little below the freezing point at any season. Beyond that light an increased elevation of 150 feet roughly corresponded to a fall of the thermometer of 1° F., and a depression of the barometer of ½ inch, so that at 15,000 feet very arduous winter conditions were encountered. Mr. Copeland thought, however, that in the early summer an experimental station might be maintained for a few weeks as high as 18,500 feet. Pieces of apparatus 2 tons in weight could readily be transported to any of the stations up to 14,360 feet.

A New Current Meter.

One of our exchanges gives a short account of a new and interesting appliance, proposed by a Mr. L. d'Auria, for determining the mean velocity of the water at any vertical in a stream. The apparatus consists of a scow or pontoon, to be moved in the desired place; a pole with a pulley near each end, carrying an endless cord; a light ball, and a species of net or grillage. The pole is thrust to the bottom alongside the scow, at the point where the velocity is to be gauged, and the ball is lightly attached to the cord by a string, so as to be disengaged by a moderate pull when it reaches the pulley at the bottom. The time of the disengaging pull is noted, and also the time of the appearance of the ball at the surface. As the floating grillage has previously been moored over this place, the ball is caught at the point of rising, and the horizontal distance of this point from the pole measured. Hence are known, upon measuring the depth, the two co-ordinates of the point at the surface from the bottom of the pole. Mr. d'Auria proposes to weight the ball until it shall be one-half the heaviness of water, and deduces some equations to prove that the ball rises with a practically uniform velocity. He observes that, for a depth of 30 feet, from which such a ball would rise in about 11 seconds, and a mean velocity of current of 4 feet per second, the ball would travel horizontally about 44 feet.

Veneer Making.

In an article on the subject of veneers, the *Northwestern Lumberman* gives some interesting facts. Straight grained and moderately soft woods are sliced off a log by a weighted knife with a drawing cut, the log being 10 feet long and the veneers varying from ¼ inch to ½ inch in thickness, the width corresponding, of course, to the diameter of the log. A knife machine which gives a half-rotary movement to a semi-cylindrical turned log, allowing a veneer to be cut following the log's diameter, produces wide veneers from logs of small diameters. But while the knife has opened up new possibilities in veneer manufacture, the saw has by no means been abandoned; such woods as ebony and lignumvitæ cannot be cut with a knife, while finely figured and consequently close-grained mahogany, and some rosewoods, are difficult to cut. The saw, therefore, has its place. Such saws must be very thin, and so finely adjusted that hardly the slightest variation will occur in the thickness of the veneers turned out. While a nicely arranged circular saw will turn out boards varying the twentieth part of an inch, which would be imperceptible, such a lack of uniformity in thin sheets would prove a damaging imperfection. Before being cut the veneer material must be carefully steamed, the same as in bending. A tight box 12 feet long and 4 feet deep and wide is used, and exhaust steam is utilized. An ordinary wood like black walnut, which has an open grain, will steam sufficiently in six hours, but the close-grained South American woods require 36 hours. Mahogany will steam sufficiently in 24 hours. Mahogany, tulip, and rosewood, being hard to cut, require more and careful steaming and a knife in the best condition. The veneers wrinkle when laid together, but straighten out readily when glued properly to a body. Veneers will dry in the air in about 12 hours, but are not kiln-dried, although the latter method is used for lumber out of which veneers are to be made.

Mr. John Roach has been interviewed, and the following is extracted from the printed report thereof: "How is it, Mr. Roach, that you were able to bid so much lower than any one else for the contract for building the

cruisers?" "Simply because I make every thing pertaining to a ship. I take the ore and turn out a ship. I thus get a profit on every part, and, though much may not be made on one part, in the aggregate of profits I get a fair return. Steel-making is a new industry in this country, and I am the only shipbuilder who has a steel plant in his own yard. Mr. Cramp complained, when the bids were opened, that the steel-makers from whom he got bids asked him 3 cents a pound more for steel than my estimate. As there are to be 13,000,000 pounds of steel in the four ships, this would make a difference of \$390,000 in the cost of the material alone. I, however, by making the steel myself, am able to bid that much less, and yet to make a profit." Query.—Why don't Mr. Roach sell his steel for 3 cents per pound more than he can get for it from the Government, instead of building cruisers with it?

The Lick Telescope.

Mr. John Michels says: "It appears that the project of building great telescopes is easier in the conception than in the final execution. Twelve months ago I visited Mr. Alvan Clark's optical works at Cambridgeport, Mass., and saw the great Streuve object glass placed for the first time within its colossal tube and pointed toward a celestial object, and, after the Clarks, I was the first to test its powers. It was still uncorrected, but worked to a marvel, considering that the most delicate and artistic touches had still to be added. Yet it must be confessed that an astronomical telescope directed at a fixed star is one of the most disappointing things to look through, and, even with the biggest telescope objective which ever left the hands of the optician, there was no exception to this rule. With all its powers, this wonder and masterpiece of the Clarks was unable to resolve the disk of the far-off star, and in this respect it was on a level with a little dollar instrument—a mere plaything in the hands of a child. Its wonderful light-gathering properties, however, were startling, and the feeble rays of the star were increased to a blaze of light. It has since been delivered to Professor Streuve, and in his hands and under his able management fine work may be expected from this noble instrument."

"But on a table in the workshop was placed the great telescope objective, 3 feet in diameter, made for the Lick Observatory in California, which in size would dwarf the king of telescopes, ready to start for Russia. It may not be known to all that achromatic object glasses are made of two distinct lenses, one made of flint glass and the other of crown glass, the two combined making the perfect lens. In this instance the flint-glass lens only was present, its companion being daily expected from France. A few days ago I wrote to Mr. Clark asking what progress he had made with the Lick objective, hoping, as the preparations in California were so advanced, that the lens was nearly finished. The public will probably be surprised to hear that the first chip off the glass has still to be made, and that the lens I saw last year in its crude state still remains in the same condition. It appears that the crown-glass disk has not yet arrived, and Mr. Clark dare not attempt the labor of polishing the immense flint portion until he is assured that the companion is forthcoming. When it will be ready, if ever, appears to be a problem to be solved only by time. There is no doubt about the ability of the Clarks to grind and polish the objective if the material ever reaches their hands, but the difficulty in obtaining a solid disk of crown glass 3 feet in diameter, perfect in all respects, can hardly be appreciated. Even the Streuve glass, which was smaller, had a bad flaw in it right in the center. Mr. Clark offered to order another disk, but Mr. Streuve, fearing the long delay, accepted the lens in that state. It will thus be seen that, however forward the observatory may be, a long time may elapse before the great 36-inch Lick telescope will be in position, interpreting the mysteries of the heavens."

The annual report of the Commissioner of Internal Revenue for the last fiscal year was made public on the 4th inst. The Commissioner estimates that the internal revenue receipts this year will reach \$120,000,000. The tobacco collections last year amounted to \$42,000,000. The production of tobacco and snuff increased from 172,000 pounds in 1882 to 181,000 pounds in 1883. There were 18,000,000 bushels of grain consumed in the production of spirits in the last fiscal year, which was 9,000,000 bushels less than during the preceding year. The production of spirits during the year was 72,000,000 gallons, or 32,000,000 gallons less than during the preceding year. The production of Bourbon amounted to 20,000,000 gallons. The quantity of distilled spirits in the United States on the first of last month, except that in customs bonded warehouses, was nearly 116,000,000 gallons, distributed as follows: In bond, 74,000,000 gallons; in hands of wholesale dealers, 14,000,000 gallons, and 28,000,000 gallons in hands of retail dealers. The amount of Bourbon in bond June 30 was 55,000,000 gallons, and the amount of rye was 18,000,000 gallons. During the first quarter of the current year the production of spirits was 13,000,000 gallons, and the quantity withdrawn from bond was 19,000,000 gallons. The Commissioner recommends that the law be so changed as to require vinegar makers to pay tax on alcohol used by them, and to allow them a drawback for the tax thus paid.

The *New York World* says: "The laws of the United States forbid the obstruction of navigable waters by bridges under or through which vessels cannot pass. It is evident that we also need a law to forbid the erection of wire fences, which interfere with persons engaged in the anise-seed bag industry. The Long Island farmers have in several instances selfishly inclosed their fields with wire fences. The consequence is that persons riding in hot pursuit of anise-seed bags ride into these fences and are thrown to the ground. During the present week serious accidents of this kind have happened, and if the wire fences are not removed there is a prospect that the anise-seed bag industry on Long Island will be ruined."

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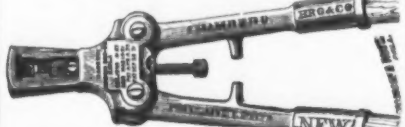
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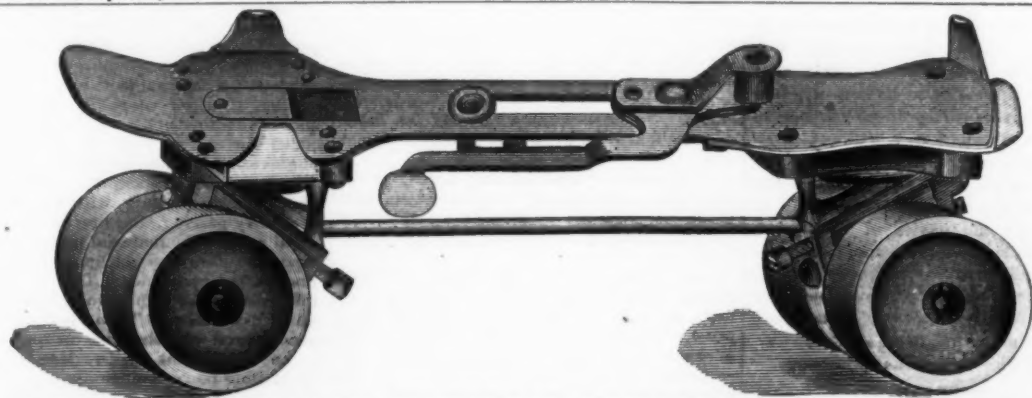
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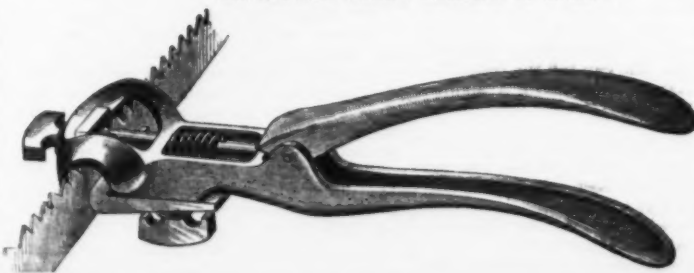
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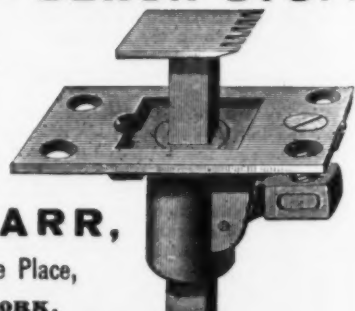
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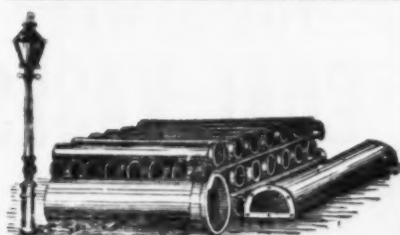


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INDUSTRIAL ITEMS.

MASSACHUSETTS.

Woods, Sherwood & Co., Lowell, have recently added another department, the manufacture of tempered steel wire for card-clothing purposes, and are said to be making large sales.

The Chapman Valve Works, at Indian Orchard, are full of business. New buildings have been added to the original plant, first erected in 1875. The structures now cover a large tract of ground nearly in the form of a quadrangle, and, being all brick, present almost the appearance of a walled town. Running directly through this mass of buildings is a spur track of the Boston and Albany Railroad connecting with both the main line and the Athol branch. The iron used is of the best quality, and comes directly from the smelting furnaces. In all departments of the work about 120 men are employed to turn out 4500 valves and hydrants a month.

The Pevey Brothers, Lowell, iron founders, still continue to increase their business, now making quite a specialty in house work, columns and mill repairs. They have two large molding rooms, &c., furnished with monitor skylights, the novel window fastenings attracting considerable attention, being operated from outside.

The Norway Steel and Iron Works, South Boston, are turning out steel plates for the Government cruisers. Some samples taken at random gave 66,000 pounds tensile stress per square inch, with 31 per cent. elongation, as tested by a U. S. N. Government inspector of material.

At Chicopee, the Belcher & Taylor Agricultural Tool Company are occupying the new addition to their main building, and their facilities are greatly increased.

CONNECTICUT.

The Yale & Towne Mfg. Company are building a steam crane for the Baldwin Locomotive Works, which will be driven by a Westinghouse reversing engine.

NEW JERSEY.

Articles of incorporation have been filed in the Clerk's Office of the County of Camden by the Camden Iron Works, with a capital stock of \$400,000, \$300,000 of which being set down as subscribed. The works of Jesse W. Starr, Sr., have been purchased, an order having been granted in the United States District Court at Trenton permitting Starr to dispose of his property, and vacating the order placing the iron works and other assets in the hands of his creditors. All claims against the works have been arranged and they will go into operation, it is thought, in a few weeks, as large orders have been received. The chief production will be foundry iron and machinery. Branch offices will be opened in Philadelphia and New York. The copartnership is limited, to expire, by the articles of incorporation, on the 30th of September, A. D. 1930. A majority of the stock is held by the Wood Bros., proprietors of the large iron works on Ridge Road, Philadelphia.

PENNSYLVANIA.

The ground is staked off for the erection of the mill of the new Charters Iron and Steel Company, Limited, at Mansfield, and building will soon be commenced.

The large foundry of the Shenango Machine Company was destroyed by fire at 7 o'clock on the evening of October 30. The works were fired by the explosion of a heavy run of molten metal while a cast was being made. A very high wind was raging at the time, and before the fire department could reach it the building was a mass of flames. The loss will be from \$5000 to \$10,000—partly insured. Only a few weeks ago this company's machine shop was burned, inflicting a very severe loss, which renders the present loss a very serious one.

The sale of the Huntington Car Works commenced last week, the tools, material, &c., being disposed of first. No arrangements have apparently been made by any combination or syndicate to run the works, as the articles sold have been bought by everybody who desired, and will be scattered widely.

The Ball Electric Manufacturing Company, of Reading, have applied for a charter. The company will manufacture the electric inventions of Messrs. Charles E. and R. E. Ball of New York, and H. W. Spang, of Reading, which consist of dynamo-electric machines, arc and incandescent electric lights and electric motors.

It is stated that the Pennsylvania Railroad Company have about completed arrangements to lease their anthracite mines to a syndicate headed by Hon. William L. Scott, of Erie. The entire production of these mines, which are located at Shamokin, will be 3,000,000 tons this year, and it is understood that Mr. Scott, after obtaining these mines, will greatly augment the shipments of anthracite coal westward by lake, and that the syndicate will pay \$1 per ton on all coal mined, the tonnage being assured to the railroad company.

The work of repairing Leesport Furnace is nearly completed, and it will be blown in shortly.

The Pottstown Iron Company have partially shut down their boiler-plate mill for want of orders.

The works of the Keystone Hardware Manufacturing Company, in Reading, are announced for sale.

The chain works at West Middlesex, owned by the Wheeler Iron Company, caught fire on Nov. 2, at 8 o'clock, and were burned to the ground. The forges and chimneys are standing, and a new building will be erected at once. About 60 hands are thrown out of employment. The loss is partially covered by insurance. The offices and rolling mill were saved by tearing away one end of the building that was burned.

Latham & Matthews, hardware agents, at No. 15 North Sixth street, Philadelphia, have made an assignment to Samuel B. Huey. The firm's liabilities are about \$25,000, and the assets are at present unknown.

PITTSBURGH AND VICINITY.

Tibby Bros. have started to bore a gas well on their property at Sharpsburg, whose product they will use at their glass works. They are running two furnaces at present, and trade is good.

The Pittsburgh Tool Company, organized but one year ago, have gathered together a very choice outfit of tools and machinery for manufacturing their special class of works. They make in their forging department iron and steel tuyeres and scraper heads, and in their tool department taps, dies, screws, finished machine bolts, drills, &c.

The Edgar Thomson Steel Works are about to attempt to operate their works with natural gas.

During the six weeks from September 8 to October 13, No. 1 Furnace of the Isabella Furnace Company made 8680 $\frac{3}{4}$ tons of iron of 2268 pounds, an average of 1446 tons. The furnace has now been in blast two years and eight months, and has made over 151,000 tons of iron on the present lining.

OHIO.

The Cummer Engine Company now have a capacity of about four engines per week, and expect by spring to be able to turn out five or six engines per week.

The steel-rail department of the Cleveland Rolling Mill Company is now turning out about 250 tons of rails per day.

The American Nail Machine Company, Ashtabula, have just shipped a consignment of their machines to Antwerp, Belgium, and the demand for them is such that the company will have to increase their facilities and force.

The new Kelly nail mill, at Ironton, made its first heat last week. One of the boiling furnaces was fired up and two heats were made and rolled, to see how the rolls would work. The results were very satisfactory. The forge will be in full operation and some of the machines running by the latter part of this week.

The new steel plant of the Bellaire Nail Works is rapidly advancing toward completion.

ILLINOIS.

The Chicago Forge and Bolt Company are erecting a new 40 x 100 feet warehouse and stockhouse.

The Malleable Iron and Machine Company, of Aurora, are doing an active business in their gray iron department, but are doing but little in malleables.

The Perfection Window Cleaner Company, of Chicago, have removed their office and factory to No. 27 Washington street, in order to better accommodate their rapidly increasing trade. Their present location is much more convenient to the hardware district and better adapted to their business.

Conrad Coltenedt, of Chicago, manufacturer of copper kettles, boilers and stills, has made a voluntary assignment. Liabilities, \$30,000; assets estimated at \$18,000. The creditors are chiefly in Chicago and Pittsburgh.

KENTUCKY.

The tall smoke-stack at the blast furnace of the Norton Iron Works, at Ashland, recently fell to the ground during a wind storm. The stack was entirely of brick, and 157 $\frac{1}{2}$ feet high. In its falling, however, but little damage was done, as it did not fall at length, but, rather, seemed to cave in and fall in a mass. The accident will seriously interfere with the operation of the works.

MICHIGAN.

It is stated that the Emmett Mining Company have definitely determined to build a blast furnace at Iron River.

MISSOURI.

The Helmbacher Forge and Rolling Mill Company, of St. Louis, are now in full operation, and are turning out some fine work in the way of steamboat shafts and other heavy work.

The recent purchaser of the Standard Tool Works in St. Louis does not intend to start them up until next spring at the earliest, on account of the poor condition of business.

The St. Louis Ore and Steel Company made the largest monthly output at their works in the month just closed ever made in their history.

A Well-Tried Steel Steamship.—New Zealand papers to hand contain accounts of the grounding of the steamship Rotomahana, belonging to the Union Steamship Company of New Zealand, on Waipapa Point—the same dangerous reef on which the ill-fated Tararua and many lives were lost on the 28th of April, 1881, and where it had been the subsequent intention of the New Zealand Government to raise a lighthouse. The mishap to the Rotomahana occurred on the morning of Saturday, the 4th of August. At the time of the accident she was going at the rate of nine knots an hour, but the discovery that she was in the vicinity of breakers enabled the officers in charge to telegraph orders to the engine-room, which had the effect of considerably reducing the speed before she struck. She lay bumping on the reef for some time, but was ultimately got clear, and returned to Port Chalmers in safety. Subsequent docking showed that the vessel had sustained serious damage to her propeller and stern frame, large portions of these having been completely broken off. In addition to these, the bottom of the vessel for a considerable length aft had been dented and misshapen, and rivets started, but no actual piercing had taken place, doubtless owing to the material of which she is built being mild steel of great ductility. It is estimated that \$4000 or \$4500 will have to be expended in putting the vessel to rights. This is the third occasion on which the Rotomahana has accidentally grounded, sustaining damage, and yet come well through the ordeal. She was built in 1879 by Messrs. Denny, of Dumbarton, and was the first ocean-going steamship built of mild steel.

WHOLESALE METAL PRICES, November 7, 1883.

(For Wholesale Hardware Prices See Pages 27, 28.)

METALS.

IRON.—Duty: Bars, 8-10¢ to 11-10¢; provided that no Bar Iron shall pay a less rate of duty than 35¢. Sheet, 11-10¢ to 15-10¢. Band, Hoop and Scroll, 1¢ to 1-10¢. Railroad Bars weighing more than 25 lb. per yard, 7-10¢ of 1¢ per lb.

American Iron.
Foundry No. 1..... 20.50 @ 21.00
Foundry No. 2..... 19.00 @ 20.00
Gray Forge..... 18.00 @ 19.00

Scotch Iron.
Carnbroe..... 22.00 @ 23.00
Coltless..... 22.75 @ 23.00
Shotts..... 22.00 @ 23.00
Glenarnock..... 22.00 @ 23.00
Gartsherrie..... 22.00 @ 23.00
Langloan..... 22.25 @ 23.00
Summerlee..... 22.75 @ 23.00
Dalmellington..... 20.75 @ 21.00
Eglinton..... 20.50 @ 21.00

Rails.
Steel, at Eastern mills..... 35.00 @ 35.00
Old Rails, Ts..... 22.00 @ 23.00

Scrap.
Wrought, 1/2 ton, from ship and yard..... 23.00 @ 24.00

Bar Iron from Store.

Common Iron:
1/2 to 1 in. round and square..... 2 1/2 @ 3.10¢

Refined Iron:
1/2 to 1 in. round and square..... 2 1/2 @ 2.30¢

1 to 6 in. x 1/2 to 1 in..... 2 1/2 @ 2.50¢

Rods—1/2 and 1-1/2 round and sq..... 2 1/2 @ 2.40¢

Bands—1 to 6-1/2 to No. 12..... 2 1/2 @ 2.70¢

Norway Nail Rods..... 5 @ 5.4¢

Sheet Iron.

Common American..... 4 1/2¢

Nos. 10 to 16..... 3 1/2¢ to 3.30¢

17 to 20..... 3.30¢ to 3.50¢

21 to 24..... 3.50¢ to 3.75¢

25 and 28..... 3.75¢ to 4.00¢

27..... 4.00¢ to 4.25¢

28..... 4.25¢ to 4.50¢

Galvanized, 10 to 20..... 6 1/2¢

Galvanized, 21 to 24..... 7 1/2¢

Galvanized, 25 to 28..... 7 1/2¢

Galvanized, 27..... 8 1/2¢

American Russia..... 10 1/2¢

Russia..... 10 1/2¢

American Coked Sheet..... 7 1/2¢

Iron Wire.

STEEL.—Duty: Ingots, Bars, Sheets, &c., valued at 4¢ per lb. or less, 45¢ ad. val.; valued above 4¢ and not above 7¢ per lb., 2¢ ad. val.; valued above 7¢ and not above 10¢ per lb., 2 1/2¢ ad. val.; valued above 10¢ per lb., 3¢ ad. val. Extra: Steel Bars, Rods, &c., cold hammered or polished, in any way in addition to ordinary hot rolling, 1 1/2¢ per lb. in addition to above; Steel Circular Saw Plates, 1¢ per lb. in addition to the above.

American Cast Steel.

For American Steel, see Pittsburgh quotations.

English Steel.

Best Cast..... 15 1/2¢

Extra Cast..... 16 1/2¢

Circular Saw Plates..... 18 1/2¢

Round Machinery Cast..... 18 1/2¢

Swaged Cast..... 18 1/2¢

Best Double Shear..... 18 1/2¢

Blister, 1st quality..... 18 1/2¢

German Steel, Best..... 18 1/2¢

3d quality..... 18 1/2¢

Sheet Cast Steel, 1st quality..... 18 1/2¢

3d quality..... 18 1/2¢

3d quality..... 18 1/2¢

TIN.—Duty: Plates, Sheets, Tagger and Terne, 1¢ per lb.; Bars, Block and Pigs free.

Banca..... 23 1/2¢

Straita..... 22 1/2¢

English..... 22 1/2¢

Bar..... 23 1/2¢

Charcoal Tin Plates.

1 C 10x14..... 225 sheets..... 12.50 @ 13.50

1 C 12x12..... 225 sheets..... 12.50 @ 13.50

1 C 20x28, 112..... 7.50 @ 8.00

1 C 10x14..... 225 sheets..... 7.50 @ 8.00

1 C 12x12..... 225 sheets..... 7.50 @ 8.00

1 C 18x24, 112..... 7.50 @ 8.00

1 C 18x24, 112..... 7.50 @ 8.00

For each additional X add..... 1.75

Coke Tin Plates.

1 C 10x14..... 225 sheets..... 12.50 @ 13.50

1 C 12x12..... 225 sheets..... 12.50 @ 13.50

1 C 20x28, 112..... 7.50 @ 8.00

1 C 10x14..... 225 sheets..... 7.50 @ 8.00

1 C 12x12..... 225 sheets..... 7.50 @ 8.00

1 C 18x24, 112..... 7.50 @ 8.00

1 C 18x24, 112..... 7.50 @ 8.00

For each additional X add..... 1.75

Tin Boiler Plates.

1 C 14x26, 2 sheets for No. 7, 112 sheets..... 13.50

1 C 14x26, 2..... No. 8..... 14.50

1 C 14x26, 2..... No. 9..... 15.50

1 C 14x26, 2..... No. 10..... 16.50

1 C 14x26, 2..... No. 11..... 17.50

1 C 14x26, 2..... No. 12..... 18.50

1 C 14x26, 2..... No. 13..... 19.50

1 C 14x26, 2..... No. 14..... 20.50

1 C 14x26, 2..... No. 15..... 21.50

1 C 14x26, 2..... No. 16..... 22.50

1 C 14x26, 2..... No. 17..... 23.50

1 C 14x26, 2..... No. 18..... 24.50

1 C 14x26, 2..... No. 19..... 25.50

1 C 14x26, 2..... No. 20..... 26.50

1 C 14x26, 2..... No. 21..... 27.50

1 C 14x26, 2..... No. 22..... 28.50

1 C 14x26, 2..... No. 23..... 29.50

1 C 14x26, 2..... No. 24..... 30.50

1 C 14x26, 2..... No. 25..... 31.50

1 C 14x26, 2..... No. 26..... 32.50

1 C 14x26, 2..... No. 27..... 33.50

1 C 14x26, 2..... No. 28..... 34.50

1 C 14x26, 2..... No. 29..... 35.50

1 C 14x26, 2..... No. 30..... 36.50

1 C 14x26, 2..... No. 31..... 37.50

1 C 14x26, 2..... No. 32..... 38.50

1 C 14x26, 2..... No. 33..... 39.50

1 C 14x26, 2..... No. 34..... 40.50

1 C 14x26, 2..... No. 35..... 41.50

1 C 14x26, 2..... No. 36..... 42.50

1 C 14x26, 2..... No. 37..... 43.50

1 C 14x26, 2..... No. 38..... 44.50

1 C 14x26, 2..... No. 39..... 45.50

Printers' Rules..... 45¢

Sheets wider than 30 in. and under 40 in..... 47¢

40 in. and over..... 50¢

Circular sheets, in diam. from 4 in. to 14 inclusive..... 40¢

over 14..... 45¢

over 20..... 45¢

over 30..... 45¢

over 40..... 45¢

over 50..... 45¢

over 60..... 45¢

over 70..... 45¢

over 80..... 45¢

over 90..... 45¢

over 100..... 45¢

over 110..... 45¢

over 120..... 45¢

over 130..... 45¢

over 140..... 45¢

over 150..... 45¢

over 160..... 45¢

over 170..... 45¢

over 180..... 45¢

over 190..... 45¢

over 200..... 45¢

over 210..... 45¢

over 220..... 45¢

over 230..... 45¢

over 240..... 45¢

over 250..... 45¢

over 260..... 45¢

over 270..... 45¢

over 280..... 45¢

over 290..... 45¢

over 300..... 45¢

over 310..... 45¢

over 320..... 45¢

over 330..... 45¢

over 340..... 45¢

over 350..... 45¢

over 360..... 45¢

over 370..... 45¢

over 380..... 45¢

over 390..... 45¢

over 400..... 45¢

over 410..... 45¢

over 420..... 45¢

over 430..... 45¢

over 440..... 45¢

over 450..... 45¢

over 460..... 45¢

over 470..... 45¢

over 480..... 45¢

over 490..... 45¢

over 500..... 45¢

over 510..... 45¢

over 520..... 45¢

over 530..... 45¢

over 540..... 45¢

over 550..... 45¢

over 560..... 45¢

over 570..... 45¢

over 580..... 45¢

over 590..... 45¢

over 600..... 45¢

over 610..... 45¢

over 620..... 45¢

over 630..... 45¢

over 640..... 45¢

over 650..... 45¢

over 660..... 45¢

over 670..... 45¢

over 680..... 45¢

over 690..... 45¢

over 700..... 45¢

over 710..... 45¢

over 720..... 45¢

over 730..... 45¢

over 740..... 45¢

over 750..... 45¢

over 760..... 45¢

over 770..... 45¢

over 780..... 45¢

over 790..... 45¢

over 800..... 45¢

over 810..... 45¢

over 820..... 45¢

over 830..... 45¢

over 840..... 45¢

over 850..... 45¢

over 860..... 45¢

over 870..... 45¢

over 880..... 45¢

over 890..... 45¢

over 900..... 45¢

over 910..... 45¢

over 920..... 45¢

over 930..... 45¢

over 940..... 45¢

over 950..... 45¢

over 960..... 45¢

over 970..... 45¢

over 980..... 45¢

over 990..... 45¢

over 1000..... 45¢

over 1010..... 45¢

over 1020..... 45¢

over 1030..... 45¢

over 1040..... 45¢

over 1050..... 45¢

over 1060..... 45¢

over 1070..... 45¢

over 1080..... 45¢

Four cents per lb. more than High Brass.

Gilding Metal 1/2 lb. more than High Brass.

Platers' or Gold Metal—Sawed..... 45¢

Planed or Polished..... 51¢

IRON SLITTING.

Metal, in width 2 in. to 3 1/2 in. to No. 23, inclusive, 1¢

per lb. advance.

Metal, in width 2 in. to 1 in. thinner than No. 23, 2¢

per lb. advance.

Metal, in width 1 in. to 1/2 in. thinner than No. 23, 3¢

per lb. advance.

Metal, in width 1/2 in. to 1/4 in. inclusive, not thinner

than No. 23, 2¢ per lb. advance.

American Society of Mechanical Engineers.

NEW YORK MEETING.

Wednesday.

The American Society of Mechanical Engineers met on Wednesday evening in the rooms of the American Society of Civil Engineers, No. 127 East Twenty-third street, New York. The attendance was large and represented the best elements of the membership, including many gentlemen of eminent standing in the profession. The call to order was not very promptly given, as the members were so busily occupied in hand-shaking and introductions that no one seemed to be in haste to get to business. About half-past eight Dr. E. D. Leavitt, president, tapped for attention. The programme called for some opening remarks by Prof. Henry Morton, but that gentleman was unfortunately absent, and Dr. Leavitt excused himself from the task of taking his place and delivering an opening address. After some routine business, Mr. T. R. Pickering was called on to read the first paper of the session, entitled "American Machinery at Foreign Exhibitions." Mr. Pickering said that he was scarcely prepared to present a finished paper, having yielded to the secretary's persuasion so recently that he could only offer some discursive notes which he would subsequently amplify. It was soon evident to the audience, however, that nothing in the shape of an apologetic introduction was necessary, for Mr. Pickering's notes were extremely interesting, and were found to be full of good points. He described the experience of American exhibitors at Paris and Vienna, the difficulty they had in securing any recognition or co-operation from United States representatives and commissioners, and the gratifying success which had attended American competition for medals and honors. In his notes on the Vienna Exhibition he quoted, on the one hand, from the report of the Massachusetts Commissioner, to the effect that the American department "would not do credit to a Worcester County fair;" and, on the other, from the report of Professor Reuleux, of Berlin, recognizing the remarkable ingenuity and skill which characterized the productions of this country, an opinion which was sustained by the awards made by the Group Jury. We hope soon to have Mr. Pickering's paper in shape for publication, and can promise our readers a pleasant and profitable entertainment in its perusal.

The paper gave rise to a somewhat discursive discussion, in which Mr. C. E. Emery, Dr. Grimshaw and others took part. Mr. A. C. Hobbs was also induced to give some reminiscences of his experiences abroad, and, although not relevant to the subject of the paper, were so entertaining that he was kept talking long after he had finished what he had intended to say at the outset. The stories he told of his world-famous exploits in picking and opening the best English and Continental locks were so entertaining in themselves, and were so well told, that the company would willingly have listened for hours, and twice he was urged to resume after he had taken his seat. To call out an engineer on two *encores* is something unusual, but Mr. Hobbs furnished an unusual entertainment.

At 10 o'clock supper was announced. This was served in the basement, and at its conclusion the party returned to the parlors to finish the evening in conversation.

Thursday.

The morning session was commenced about 9.30, Mr. E. D. Leavitt, Jr., presiding, and after briefly disposing of some preliminary matters of no special importance the secretary, Prof. F. R. Hutton, submitted the treasurer's report, directing attention at the same time to some points relating to the payment of annual dues. Concerning the Committee on Tests, which was next considered, Prof. T. Egleston referred to the importance of reprinting that portion of the Transactions of the American Society of Mechanical Engineers containing the discussion on the subject of a Government appropriation for testing materials, in sufficient numbers to place a copy in the hands of every Member of Congress. This subject, as our readers will probably remember, has repeatedly received attention in our columns, thus rendering very extended particulars unnecessary now. The bill, as Professor Egleston remarked, did not fail to pass on account of its lack of merit, but mainly because it had not received sufficient support at the proper time. The expense of furnishing the necessary copies referred to was estimated at about \$200, which, considering the importance of the subject and the benefits attending a successful passage of the bill, was comparatively trifling. The Society of Civil Engineers, as will be remembered, made considerable efforts some time since to bring about a satisfactory solution of the question, and President Leavitt consequently suggested that some particulars from Mr. Bogart, secretary of that society, might therefore prove interesting and valuable. Mr. Bogart, responding to the invitation thus extended, remarked that a committee of the American Society of Civil Engineers who called upon the Chief of Ordnance some time ago, found the latter strongly in favor of co-operating with the different engineering societies in order to secure the best results from the Government testing machine at the Watertown Arsenal. He also referred to the late period at which the bill was introduced, ascribing to it, as did Professor Egleston, the unsuccessful result of the undertaking. The committee of the Civil Engineers' Society was to co-operate with the Chief of Ordnance, but no further action was taken to insure the passage of the bill. At present the committee did not feel authorized to take any decisive steps in the matter. Professor Egleston, again referring to the subject, remarked that present indications did not point to harmony between engineers and the Ordnance Department, and urged the necessity of taking immediate action, without awaiting further developments at the forthcoming meeting of the Society of Civil Engineers, to be held in January next. Delay up to that time would, it was thought, yield a result similar to that

obtained last year. After a good deal of discussion, and in view of the vital importance of the subject, it was concluded to appropriate the funds (not to exceed \$200) necessary to reprint the paper above mentioned. Taken altogether, however, there was a perceptible lack of enthusiasm in connection with the whole matter, so much so, in fact, as to provoke some comment from Professor Egleston.

For some reason which, it would appear, was not clearly stated, the report of the Committee on Gauges and Standards, though called for, was not submitted, and attention was therefore next given to the report on the

HOLLEY MEMORIAL FUND

by Mr. J. C. Bayles. It was stated that practically the whole amount required for the Holley memorial fund had been secured, and that, though a small additional amount would be necessary, no difficulty would be experienced in readily obtaining it. At the same time Mr. Bayles pointed out that the Central Park Commissioners could not authorize the erection of the bronze before the expiration of five years from the time of Mr. Holley's death, this length of time being required by law.

As to the visit of the British Iron and Steel Institute to this country in 1884, Mr. Bayles remarked that during the past summer two gentlemen well known in this country were in Great Britain and had conferences with members of the Iron and Steel Institute, and Mr. Carnegie had an official conference with the council. In these several interviews the general desire was expressed by the Institute to visit this country in 1884, and it now seems probable that representative delegates will come to this country if assurance be given that the engineers and ironmasters here will take suitable measures to secure a pleasant gathering. Mr. Bayles was aware that the discourteous reception of the previous invitation extended by the American Institute of Mining Engineers, and the American Society of Civil Engineers, and presented personally by the late A. L. Holley, had created a decided feeling, and that it would probably be impossible to secure for the British Institute another invitation to hold a meeting in this country. The matter, however, would be brought about, if at all, in a way to relieve the different engineering societies from extending a formal invitation. Those members who intended to come to this country would avail themselves of the meeting of the British Association in Montreal, Canada, and would then be in a position to readily come to this country if an invitation were extended. Under these circumstances, it would be necessary for the American Society of Mechanical Engineers to recognize their presence, and as a preliminary to any formal action Mr. Bayles stated that he would offer the following resolution:

Resolved, That the council be requested to appoint a committee of three members to co-operate with committees representing the Institute of Mining Engineers, and the Society of Civil Engineers, with instructions to consider and report what action should be taken by this society in the event of an expression by the British Iron and Steel Institute of a desire to hold a meeting in this country in 1884.

Following this, considerable attention was devoted to the financial condition of the society, and the suggestion of Mr. Henry R. Towne to strengthen its basis by increasing the annual dues from \$10 to \$12 met with considerable opposition. Mr. Charles T. Potter, for example, considered the condition as anything but desperate, holding that future financial strength should be secured by a steady growth in membership, and that a radical change such as that proposed was by no means desirable. The prevailing opinion seemed to be that the present annual fee was ample, and that an extension of the society would yield desirable results. This growth, as remarked by one of the members, would undoubtedly be stimulated by the reading of more readily comprehensible papers—that is to say, papers embracing fewer complex formulae intelligible only to those who had enjoyed the advantages of a higher mathematical education. As to the progress made by the society in this direction within the past year, a brief outline furnished by Secretary Hutton gave some interesting particulars. From these it appeared that since November, 1882, up to the present time, 37 new members had been admitted, making a total of 454. Considering the fact that the time during which applications for membership were received did not cover a full year, the results could not be regarded as highly satisfactory. At the same time, however, as stated by Mr. Towne, initiation fees cannot be relied upon for a very long period as fully sufficient to meet current expenses, and a further consideration of the financial question will, therefore, probably become necessary at no very distant date.

Having thus for the time being disposed of this subject, attention was given to the result of the annual election of officers, which was as follows: President, John E. Sweet; vice-presidents, A. B. Couch, W. R. Eckart, J. Vaughan Merrick; managers, W. F. Durfee, Charles C. Worthington, Oberlin Smith; treasurer, Charles W. Copeland; secretary, F. R. Hutton.

After the announcement of the names of newly-elected members, associates and juniors by Professor Hutton, President Leavitt called for Mr. J. C. Hoadley's paper on

A TILTING WATER METER FOR EXPERIMENTAL PURPOSES.

Lack of space precludes its extended notice, and we will consequently refer to it in detail in an early issue. The fact that the use of the apparatus is attended with important advantages as to accuracy in the measurement of water elicited interesting remarks from different members concerning water meters in general and errors arising from their use. The expansion and contraction with different temperatures of the materials employed in this construction, and the incorrect figures resulting from these causes, were referred to at some length, the discussion also embracing particulars relative to the varying measurements of water in Worthington meters for varying speeds of piston. In this, as well as in the discussion of the succeeding paper, a wide range of subjects was considered, some of the members apparently losing sight of the original topic. At the same time, however,

the particulars thus brought out were of an exceedingly interesting character, and close attention was given to the remarks on inaccuracies in thermometric indications of temperatures of water in feed pipes, owing to compression of the thermometer bulbs, the use of mercury wells to obviate errors of this kind, and a variety of other equally interesting details.

The second paper read was that of Prof. Thomas Egleston on

A MACHINE FOR OBSERVING THE PHYSICAL CHANGES OF METALS.

The machine, it appears, was suggested by the breaking of a rail on the Northern Railway of France, in the year 1873, different portions of which, when subsequently tested, were found to exceed the required degree of strength. The paper was prefaced by a short account on the breaking of rails and the fatigue of metals, in the course of which the author advocated discarding the term "hardness" and substituting "abrasive resistance." The term "hardness" was remarked to convey no distinct meaning, signifying in some cases brittleness, in others toughness, and in still others comparative softness. Without going into particulars, we would here state that Professor Egleston's method of testing the hardness of metals, or their "abrasive resistance," as he would term it, embraced the use of a drill in connection with the specimen to be tested. This special point elicited considerable discussion, Mr. Towne suggesting that the operation of cutting the metal scarcely seemed to be a fair test, its accuracy depending upon the temper of the cutting tool, its angle, temperature of the material and other equally important factors. Again, when using a drill as in the machine described, different portions of the tool worked at greatly varying speeds, and one of the members thought that by first drilling a small hole in the specimen operated upon, so as to allow only the more rapidly-moving points of the drill to perform work, more satisfactory results might be obtained. The use of lathe or planer tools was proposed as still other remedies for what were considered as defects in the appliance. As already stated in the preceding remarks, the discussion in this case also gradually drifted away from the original subject, interesting comments being furnished as to the manufacture and composition of brass, copper and copper castings.

Before the close of the meeting Professor Hutton read a letter from Prof. George W. Maynard, inviting the members of the society to visit the Hecla Iron Works, in Brooklyn, where the Bower-Barff rustless iron process could be seen in operation.

Afternoon Session.

The afternoon session was called to order shortly after 2 o'clock, Mr. J. F. Holloway acting as chairman. Before proceeding to the reading of the papers, Mr. Henry R. Towne, president of the Yale and Towne Manufacturing Company, of Stamford, Conn., briefly referred to the excursion to the works of the company to be made on the following day. Mr. W. F. Durfee was then called upon to read his paper on

A POWER CRANE DESIGNED IN 1867.

The crane was constructed for a machine shop of the Milwaukee Iron Company, Milwaukee, Wis., and, considering the early period of its introduction, embodied numerous commendable features, among which we would mention the absence of complicated mechanism. Referring to the fact that the author of the paper stated the appliance to be the first power crane introduced in this country, Mr. Towne remarked that, without claiming to be very exact as to dates, he knew of a power crane in operation in Philadelphia within two or three years of the date given. Still another gentleman stated that he knew of a power crane which was in a machine shop of this city as early as 1861, but which at the time at which he had occasion to see it was not in operation.

Following Mr. Durfee's paper was that of Mr. Carl Angstrom, of Worcester, Mass., on

A NEW VALVE MOTION.

Diagrams of which were shown, together with a small model. This valve motion belongs to the same category as those of Brown, Marshall & Joy, known as radial valve motions. In radial valve motions, as is generally known, the motion is accomplished by an arm, two points of which move in different curves. One point moves in a closed curve, such as a circle or an ellipse, this motion being derived from an eccentric, crank or connecting-rod, while the other point moves either in an open or closed curve. This may be accomplished either by levers or slides, or both combined. In the valve motion described by Mr. Angstrom the difference from these previously mentioned consists chiefly in the mechanism for giving motion to the last mentioned point of the arm actuating the valve. The valve motion, it was thought, could be used advantageously on engines running chiefly in one direction. The paper was discussed at some length by Professor Thurston, Mr. Strong and several others, the author explaining the nature of the motion by means of the model previously referred to. Prof. Robert H. Thurston was then called upon to read his paper on the

PRESSURE ATTAINABLE BY THE USE OF THE DROP PRESS.

which gave the results of experiments recently made to determine the magnitude of pressures attainable and not infrequently utilized in using the drop press, now so extensively employed in the process of drop forging and in the manufacture of small parts of sewing machines, firearms and light machinery. The opportunity of making the tests was afforded in the course of an investigation of the efficiency of drop presses lately made at the mechanical laboratory of the Stevens Institute of Technology. It was found that the most efficient presses experimented with had an "efficiency," as the term is technically used, of 90 per cent.—i. e., the work done by the drop was 90 per cent. of that which was due to the weight falling through a measured height. In the course of his paper Professor Thurston submitted a very interesting table, which was based upon the assumption that the above efficiency can be reached, and which exhibited the mean pressure attained when the piece at-

tacked was crushed to the amount of $\frac{1}{4}$, $\frac{1}{8}$ and $\frac{1}{16}$ inch respectively. In the experiments the fall of the drop varied from 3 inches up to 5 feet, and the weight of the drop from 50 to 2000 pounds. Inspection of the table showed that with a weight of 2000 pounds, falling through a height of 5 feet and producing a compression of $\frac{1}{16}$ inch, the pressure obtained was almost 1,750,000 pounds, while, with a weight of 50 pounds, a similar amount of compression and a fall of $2\frac{1}{2}$ feet, the pressure realized was 21,601 pounds. Professor Thurston further stated that the distortion produced by the action of the hydraulic press and the action of a hammer dealing a succession of blows to produce the same change of form consumed power in the ratio, in some cases, of 1 to 10 pounds. The reading of the paper was followed by a lively discussion, in which a number of members participated. Among them Mr. Morgan referred to the loss of effectiveness of the blows caused by insufficient weight of the anvils, thus distributing the power to the surrounding objects. Mr. Oberlin Smith's paper on

SHOP ALGEBRA

was the last one read at this meeting, after which Professor Hutton again referred in detail to the invitation of Prof. G. W. Maynard to visit the Hecla Iron Works, in Brooklyn. An invitation was also received from the Brooklyn Bridge authorities to cross the bridge in a special car.

Friday.

THE EXCURSION TO STAMFORD, CONN.

In response to the invitation extended to the society by Mr. Henry R. Towne, to visit the works of the Yale & Towne Manufacturing Company, at Stamford, Conn., the members met at the Grand Central Depot, on Forty-second street, shortly before 9 a. m. About 120 members were present, for whose accommodation two special cars had been provided, which were attached to the regular 9.05 a. m. local train. The weather was perfect and contributed its full quota toward the thorough enjoyment of the hour's ride to Stamford. The two cars were quickly, but comfortably, filled as soon as the doors were thrown open, and soon the buzz of "shop-talk," mingled with the smoke of the fragrant weed, and would have left no doubt in the mind of any one, as to the vocation of the travelers. The talk was kept up in spite of all that might have been said the previous evening as to the comparative "fatigue" of metals and of engineers, and the dark figure that moved along the aisles with gaily labeled cedar boxes and loose matches was unquestionably responsible for keeping up the smoke.

On arrival of the train at Stamford the two special cars were run into the company's yard, where the members of the society were received by Mr. Henry R. Towne and the reception committee, chiefly composed of gentlemen connected with the works. The first building visited was the iron and brass foundry, remarkable for its cleanliness—a not usual attribute of a foundry—its excellent light and perfect ventilation. In this building Mr. Towne explained to the members the construction of a 5-ton Weston jib-crane, a full description of which, and the large traveling cranes manufactured by this company, will be found by referring to our earlier numbers of 1883. The brass furnaces with independent draft, and the novel use of band-saws for cutting off gates, attracted a great deal of attention. The division of the pattern shop, on the second floor of the foundry building, into two sections, one for wood and one for metal patterns, as well as the system of keeping and indexing the patterns, the excellent arrangements of the workstands and coat rooms, were very thoroughly appreciated by the visitors.

From the foundry building Mr. Towne led his guests to what is called the "post-office" building, from the fact that it is entirely devoted to the manufacture of post-office equipments—boxes, letter boxes, office windows, change counters, metal door and window signs, &c. In the erection room some complete sections of post-office boxes for the Philadelphia post office were greatly admired for their finish and beauty of design. In this building the attention of the visitors was called to the application of the overhead steam-heating system adopted throughout the shops of these works, and which we have already fully described in previous issues.

Crossing the yard, the pulley-block shop, devoted to the manufacture of Weston's differential pulley blocks, and the chain shop, were next inspected, in which latter all the chains used for pulley blocks, cranes and hoists manufactured by the works are made. The smaller sizes are all made from Norway rods, and the larger sizes from American iron of high ductility. The gauges used by the chain-makers are slightly below standard pitch. After being forged the chains are brightened by rattling, and then stretched in a special machine up to the final pitch or gauge. The strain thus applied is within the elastic limit, but has the effect of bringing the links to a permanent bearing with each other, and of giving such set to them that, when used within the intended limit of load, they will not alter their length. In this way a chain of uniform and permanent pitch is obtained, and one having the high qualities necessary for crane work.

From the chain shop the party entered the old "crane shop," which is now being fitted up for testing-machine and scale work. Here Mr. Towne explained the construction of a 6-ton Weston hand-power traveling crane, his remarks being illustrated by actual operation of the crane. In this shop was also found the newly erected Pratt & Whitney screw-cutting machine, capable of cutting the large 24-foot screws required for the Emery testing machines. Next the store and packing rooms, the "press room," where the stamping and punching of the lock department is done, and the bank-lock department were visited.

From there Mr. Towne led his guests back to the scale room, where the next hour was very comfortably spent in a thorough investigation of the constituent parts of an elegant collation. After coffee and cigars, the visitors rallied once more to the now familiar sound of Mr. Towne's whistle. He next led the way to the engine-room and boiler house containing a 20 x 42 inch Harris-Corliss engine, running 72 revolutions and developing

about 125 horse-power; also pit containing hot well, into which the condense water from the entire heating system of the works is returned, and containing also Worthington duplex pump, Berryman heater, &c.; also a battery of six tubular boilers, built by Beach & Son, of Hartford, with patent water fronts (dispensing with all brick setting about the fire-door), and Jarvis furnace setting, by means of which slack coal and other refuse is used as fuel, the present mixture consisting of one part of bituminous slack to 4 parts of anthracite pea and dust.

The party next entered the crane shop by the gallery containing the coat and wash rooms, from which an excellent view of the shop was obtained. This shop is 100 feet wide and 300 feet long, is divided into three aisles or bays, the center one having a clear span of 50 feet, and being used for heavy work and erecting and shipping purposes, the side aisles containing benches and light machine tools. Two Weston power traveling cranes, one of 20 tons and the other of 30 tons capacity, are in operation here, and their mechanism was explained by Mr. Towne. A short visit to the new—not quite completed—hammer shop followed, and then the party were conducted successively through the small lock department, the tool room and the "wheel room." In the latter some 24 men are employed in emery grinding, and it is to be noted that the atmosphere of the room is perhaps more free from dust than that of any room in the works. The removal of the injurious brass and emery dust is accomplished by large exhaust fans in the basement, the peculiar form of the hoods covering the wheels, and of the orifice leading from these to the exhaust tube, being important features.

Ascending another stairs a brief visit was made to the plating department, the first room of which contains the acid and soda tanks, &c., the second the buffing lathes for polishing by means of rag wheels, and the third the plating appliances, including the depositing tanks, dynamo machines, &c. Leaving the plating room the party entered the room in which the 75-ton Emery hydraulic testing machine is temporarily erected, and where a short series of tests of materials was made in the presence of the members. The testing machine is similar in general principles to the 400-ton Government machine at the Watertown Arsenal, but is of the upright type. It has a straining capacity of 151,000 pounds, applicable to tests of tension, compression, and transverse loads. It will receive specimens for tension up to 74 inches in length, and for compression up to 88 inches in length, with ample allowance for elongation. The supports for transverse strains can be separated 84 inches, and specimens of any length can be inserted. The construction and action of the machine was explained verbally during the process of making the tests.

Upon the conclusion of the tests the departing guests gave three rousing cheers for both Mr. Towne and Mr. Albert H. Emery, the inventor of the now world-famous testing machine. Descending the stairs the special cars were found in the yard, and the party were soon after carried to New York by the 5 p. m. fast express. The expressions of admiration of the perfect arrangements of the shops, the close attention to details, the evidences of superb discipline, as well as mechanical ingenuity, throughout the works were universal, and the excursion was unanimously voted not only a most interesting one, but a "perfect success."

Evening Session.

The evening session began shortly after 8 o'clock, and, as proposed by Professor Thurston on the preceding day, the first subject taken up was the discussion of the amendment relating to the election of officers. Though the plan at present followed by the society in this matter was considered tolerably safe, improvements could undoubtedly be suggested, and the matter was consequently referred to a special committee. Mr. C. J. H. Woodbury was then called upon to read a paper on

EXPERIMENTS ON NON-CONDUCTORS FOR STEAM PIPES.

which, owing to its great length and thorough discussion, occupied the greater portion of the evening. We cannot even attempt to here give it the attention it deserves, but would simply mention that the experiments were considered by some as having been carried out on too small a scale to give practical results. Considerable interest was attached to President Leavitt's remarks as to non-conducting boiler coverings, consisting of mixtures of plaster-of-paris and sawdust, and also to the experience of others as to corrosion of pipes resulting from the effects of moisture in the non-conducting material. Mr. Leavitt remarked that his mixtures were in the proportion of one part of plaster-of-paris and two parts of sawdust, and the estimated cost of the material, its preparation and application, was 12 cents per square foot. As an example illustrating the efficiency of the covering, Mr. Leavitt cited the fact that in boilers protected in this manner, and burning about 20 tons of coal in 24 hours, the outside temperature at distances not exceeding 6 feet was in a number of cases found to be zero degrees during the winter. In response to a special request, Professor Thurston gave a brief abstract of his paper on "The Theory of the Turbine," lack of time preventing its more lengthy consideration. He also referred to the fact that a mechanical section had been recently organized by the American Association for the Advancement of Science, and that additions to its list of members from the Society of Mechanical Engineers would be warmly welcomed. Professor Hutton then read the following papers by title: "Motive Curves for the Slide Valve," by A. W. Robinson, and "Compression as a Means of Governing Engines," by Harris Tabor. Before adjournment resolutions of thanks were offered to the retiring and retired officers of the society for their efficient services, and also to the American Society of Civil Engineers; the New York, West Shore and Buffalo Railway; Mr. Henry R. Towne, Prof. Geo. W. Maynard, and all others who had been instrumental in contributing to the entertaining features of the meeting. The members separated shortly before 11 p. m., with pleasant anticipations as to Saturday's trip to Kingston, N. J., on the line of the New York, West Shore and Buffalo Railway.

Special Notices.

To Brass Foundries.

To Brass Manufacturers.

Our new foot press, for cutting off GATES from brass castings by FOOT power, is now ready. Wright, 200 West 10th St., New York. Price complete, \$30. A boy can operate it easily. We warrant them to give the most perfect satisfaction. FREEBORN, PUNCH AND SHARP CO., 35 W. 10th St., New York.

For Sale or Lease.

A Large Two-Story Brick Factory,

formerly Machine Works, at Pearl River, N. Y., 30 railroad depot, 25 miles from New York City. Railroad facilities unexceptionable, on the line of the New Jersey and New York Railroad. The property contains 40,000 square feet floor space, with one to H. P. Engine and Boiler, 75 ft. x 20 ft. and one x 10 ft. and pulleys, main belts, steam heating and water pipes throughout the building. A splendid iron foundry, 70 ft. by 90 ft., with one iron smelting cupola with Mack-nail blower, brass furnace, core oven, blacksmith shop, pattern vaults, annealing oven, etc. The property can be bought or leased on liberal terms. For further particulars, price, terms, etc., address E. B. & Co., 113 Liberty St., New York City, or Pearl River, Rockland Co., N. Y.

For Sale.

A FIRST-CLASS JOBBING HARDWARE AND TINNERS' STOCK BUSINESS.

located in a Western city. Well established, profitable, capable of large increase. Satisfactory reasons for selling. All or part to be sold; small proportion of cash; balance on long time if properly secured. Address, for correspondence or personal interview, "M. C. & C.,"

Office of The Iron Age, 83 Reade St., New York.

For Sale.

The largest stock of New and Second-hand Engines, Boilers, and general Machinery in the West. Send for Catalogue. Hoisting Outfits for Coal Mining and other purposes a specialty.

WARREN SPRINGER,

195 to 215 South Canal St., Chicago.

For Sale.

Second hand

DROPS AND LIFTERS.

BEECHER & PECK,

Lock Box 122, New Haven, Conn.

STEAM PUMPS

For Sale.

A large number of Steam Pumps of all makes, and ranging in size from small tank or boiler feeds up to very heavy engine machines.

While the stock lasts good bargains are open for Miners, Water Works, Rolling Mills, Furnaces, or any one needing to move fluids by steam. Call upon or address

J. NO. A. HINCKLEY,

Purchasing Agent of the United Pipe Lines, Oil City, Pa.

For Sale.

MACHINES FOR MAKING PICKS, MATTOCKS AND AXES.

With Solid Punched or Adze Eyes.

T. & CO., Box 25,

Office of The Iron Age, 83 Reade St., New York.

For Sale.

FREBBLE AND DOUBLE-GEARED 25-INCH ENGINE LATHES,

from new patterns.

GEORGE A. OHL & CO.,

East Newark, N. J.

Valuable Iron Property for Sale.

An Iron Property in Central Pennsylvania on the main line of the Pennsylvania Railroad. Large bodies of Hematite and Fossil Ores, well developed. Modern appliances for the preparation of the ores. Situated close to the coal seams of the Clearfield, Broad Top and Allegheny Mountains. Coke from Connellsville can be laid down at \$2.35 per ton. A ton of Pig Iron can be made for about \$13 per ton, exclusive of interest on plant. The property has one Charcoal Furnace and Forge, and an abundant supply of Timber for making Charcoal. Satisfactory reason can be given for selling. Apply, for further particulars, to WM. DORRIS, Huntingdon, Pa.

For Sale.

LAST IRON HOT-BLAST PIPES—THOMAS PATENT.

Hot-Blast Oven Pipes for Thomas Oven, in first-class order. Price, 1 cent per lb., cash, at our works. Size, 12 ft. x 9 inches. A bargain. SHOBENBERG & BREER & CO., Pittsburgh, Pa.

To Lease.

From May 1, 1884, for a term of years, at a low rental to satisfactory parties, the manufacturing property at New London, Conn., lately occupied by the Brown Cotton Gin Company. The ground contains over 20,000 square feet. The buildings and sheds under roof measure over 25,000 square feet, of which about 20,000 feet are metal roofs. An Engine, Boiler, shafting, &c., &c. are on the premises. The property is very conveniently located for manufacturing purposes. Its entire easterly line is bounded by the land of the Shore Line Division of the N. Y., N. H. and Hartford R. R. Co.

For further particulars, apply to Messrs. J. C. LEARNED & SON,

New London, or to

B. HAXTON,

172 Centre St., New York.

Wanted.

A Partner with \$3000 to \$10,000 in a Foundry and Machine Business, established in 1824. For particulars, inquire of

L. H. COLLIER,

Poughkeepsie, N. Y.

A THOROUGH HARDWARE MAN

of experience is open to negotiation as Salesman, Manager or Buyer. Address, RELIABLE, Office of The Iron Age, 83 Reade street, New York.

Trade Report.

BRITISH IRON AND METAL MARKETS.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, NOV. 7, 1883.

Scotch Pig.—The market is not so steady, and prices are weak through disposition on the part of holders to realize. Makers' brands are quoted as follows:

Coltness, alongside, Glasgow	57
Langloan, " "	56 1/2
Gartsherrie, " "	54
Stumsherie, " "	53 1/2
Carbroe, " "	54
Glengarnock, " Ardrossan	53 1/2
Edlington, " "	47 1/2
Dalmellington, " "	47 1/2
Shotts, " at Leith	55 1/2
Lighterage from Ardrossan to Glasgow is 1/8 ton.	

Cleveland Pig.—During the past month stocks have decreased. Prices are weaker. We quote as follows, f.o.b. shipping ports:

Middlesboro, No. 1 Foundry	41 1/2
" No. 2	40
" No. 3	38 1/2 @ 38 3/4
" No. 4 Forge	37

Bessemer Pig.—The market is a little weaker. W. C. Hematites are quoted 47/48 for Nos. 1, 2 and 3, equal parts, f.o.b. shipping ports.

Blooms.—But little doing.

Manufactured Iron.—The market is a little firmer. We quote at works:

	s.	d.		s.	d.
Staff, Ord. Marked Bars	7	10	0	6	15
" Medium	6	5	0	6	15
" Common	6	0	0	6	5
Hoops, 30 W. G. and over	7	0	0	6	5
" Common Best	7	0	0	6	5
" Medium	6	5	0	6	15
" Common	6	0	0	6	5
Sheets, 30 W. G. and under	8	15	0	6	5
" Ordinary Best	8	15	0	6	5
" Common	8	10	0	6	5
Welsh Bars	5	5	0	6	5

Steel Rails.—Are a little weaker. We quote 4 1/2 @ 4 1/2, 10 for Ordinary Sections, f.o.b. shipping ports.

Iron Rails.—But little doing.

Old Rails.—The market is a little firmer. We quote Old Tees 4 1/2 @ 4 1/2, 15, and Old D. H. 4 1/2 @ 4 1/2, 17, c.i.f. New York.

Scrap.—The market continues quiet. We quote Heavy Wrought, 4 1/2 @ 4 1/2, c.i.f. New York. Bessemer Crop Ends, run of the mill, are quoted 60/6, f.o.b. shipping ports.

Copper.—The market is steady. Best Selected is quoted at 467 @ 468, and Chili Bars, 461 @ 461. 15/.

Tin.—The market is a little weaker and prices are lower. We quote Straits, Ingot, spot, 492 @ 492. 10/ and futures, 491. 15/ @ 492. 5/.

Tin Plates.—A large business has been done during the week. Prices are not so steady, and show a tendency toward lower figures. We quote:

Tin Plates, 10 x 14, 1st qual. Charcoal	19 1/2 @ 21 1/2
" " 2d " "	18 1/2 @ 20 1/2
" " 3d " "	17 1/2 @ 19 1/2
" " 4d " "	16 1/2 @ 18 1/2

Spelter.—The market is firmer. We quote Ordinary, at shipping ports, 415. 7/6 @ 415. 15/.

Lead.—Prices are firmer. Common English Pig is quoted 412 @ 412. 2/6.

Freights.—Steam from Glasgow to New York, 5/ @ 6/; Liverpool to New York, 4/6 @ 5/; Liverpool to Philadelphia, 5/ @ 6/6, and London to New York, 7/6 @ 9/6.

TRADE AND FINANCE.

Office of The Iron Age,

WEDNESDAY EVENING, NOV. 7, 1883.

The current of business during the past week has been somewhat interrupted by election excitement, but it is acknowledged that the tone is healthy, and as a rule prices are well sustained. In the grain market prices are all stronger, and as the week closes spring wheat is advanced 2¢ a bushel, on account of the near closing of navigation and steadily diminishing receipts, causing anxiety to "cover." At the same time, wheat and corn are from 2¢ to 5¢ dearer than they were a year ago. The movement of general merchandise is hardly up to the aggregate of the previous week, judging from reports received from leading trade centers. Taking the last three months together, however, the volume of transactions exceeds that of the corresponding three months in 1882. The disposition of farmers in some sections to reserve their products for higher prices just now has a quieting effect. Though railway earnings make a good exhibit, the movement by canal is rather slow. Since the opening of navigation this year the total clearances amount to 4,837,446 tons, against 4,342,909 tons cleared during the same number of weeks in 1882. Telegraphic reports received by the Chicago Tribune respecting the condition of trade and manufactures at numerous points in Illinois, Wisconsin, Iowa, Indiana and Michigan, represent that those interests are prosperous to an extent seldom credited. The farming classes are independent, as concerns the present; merchants are in no sense overstocked with goods, and, taken as a whole, manufacturing establishments are running on full time at a good profit.

The rates for sterling exchange are inclined to stiffen, in sympathy with the improved tone in stocks, and on account of the scarcity of commercial bills. The quotations are now \$4.82 1/2 @ \$4.85. Should prices of stocks induce further investments on foreign account, rates of exchange would be likely to recede. The movement of securities, rather than the exports of merchandise, are watched by bullion dealers. The London Economist of October 20 anticipates further gold shipments to New York, but is not fearful of the consequences, so long as the Bank of England has a reserve of fully £12,500,000. "We are rather inclined," the editor says, "to look for additional withdrawals, and that for two reasons. In the first place, there is now a difficulty in satisfying at Paris the United States demand for gold, and the natural result of this will be, if the demand continues, to shift it on to us. This result, too, will be all the more likely to ensue if, as seems now to be expected, the Bank of France decides to raise its rate of discount in order to cause a contraction of its note circulation, which has been expanding latterly much more quickly than is thought desirable. Such an advance would, of course, make London a cheaper source of gold supply than Paris, and so divert the demand hither. And the other reason why we think it not improbable that more gold may be taken for the States is that the heavy fall in the prices of American securities has now attracted purchasers on this side, whose operations should, if continued, tend to influence the American exchanges against us."

The weekly bank statement was favorable, showing that not only had the previous week's deficiency in the reserve been made good, but that the banks now hold a surplus of \$687,475 above legal requirements. In several respects the banks are in better condition than they were one year ago, and a further improvement is looked for. Currency is gradually returning from the West, and the demand for cotton movements in the South is less urgent. Added to these favoring circumstances, foreign gold is arriving in considerable amounts.

On the Stock Exchange during the week the market has been active, and with few exceptions prices have advanced 1/4 @ 1/2, most notably Northwestern preferred, Central Pacific and Canadian Pacific. Good railroad earnings, easy money, gold imports and liberal purchases of securities on foreign account have stimulated the improvement. Oregon Transcontinental improved, mainly as a result of speculative dealings, Mr. Keene, it is said, being the largest operator. Among other favorable influences it was believed that railroad cuttings will cease after the close of navigation. On Monday the greatest improvement was in the trunk lines, on the announcement that a meeting of presidents will take place on the 13th instant. To-day the market was languid, the result of the elections seeming to have little effect, and, at the close, prices generally were 1/4 @ 1/2 lower than on Monday, Oregon and Transcontinental dropping to 46 1/2, Northwestern to 134 1/2, Canadian Pacific to 60 1/2, Louisville and Nashville to 49 1/2, Lake Shore to 99, Missouri Pacific to 95 1/2, Pacific Mail to 39, St. Paul and Omaha to 36, and Oregon Railway and Navigation to 114.

Messrs. L. von Hoffman & Co. received to-day by three different steamers £84,000 in gold coin and bars and 1,600,000 francs; total, about \$632,000. The Railroad Gazette estimates the construction of new railroads to date, for 1883, at 5188 miles, an amount exceeded only in three of the past 12 years. Government bonds at the close to-day were as follows:

	Bid.	Asked.
U. S. 4 1/2s, 1891, registered	113 1/2	113 3/4
U. S. 4 1/2s, 1891, coupon	114 1/2	114 3/4
U. S. 4s, 1907, registered	121 1/2	122 1/2
U. S. 4s, 1907, coupon	121 1/2	122 1/2
U. S. 6 per cents	109 1/2	—
U. S. Currency 6s, 1895	132	—
U. S. Currency 6s, 1896	132	—
U. S. Currency 6s, 1897	134	—
U. S. Currency 6s, 1898	136	—
U. S. Currency 6s, 1899	137	—

In State bonds Tennessee compromise sold at 40 1/2.

A dispatch from Washington to-day intimates that Secretary Folger will recommend in his annual report the repeal of the law imposing a tax on national-bank circulation, on the assumption that the banks can afford to pay the premium on the 4 1/2 % bonds to deposit to secure their circulation.

The imports of foreign merchandise at the port during the past week were rather light, the total being but \$7,654,928, of which \$5,815,655 represents general merchandise and the remainder dry goods. Since January 1 the imports aggregate \$390,341,164, compared with \$426,606,687 for the corresponding period of 1882. The imports of specie during the week amounted to \$1,526,410, mostly in gold, making a total since January 1 of \$16,255,039, against \$4,722,341 for the same time last year, and the exports of specie for the week amounted to \$360,260, nearly all in silver, making a total since January 1 of \$13,890,021, against \$44,598,571 for the corresponding period last year. The imports of dry goods are diminished, and the total since January 1st has been \$107,906,411, against \$116,192,158 for the same time in 1882, or a decrease of \$8,106,577. The exports from the port during the past week were on rather a limited scale, the total being but \$5,416,038, against \$8,027,765 for the same week last year. Since January 1 the exports aggregate \$301,102,409, compared with \$290,231,559 for the corresponding period of 1882.

In commercial circles, as before intimated, business during the past week was comparatively quiet, with prices generally steady. In dry goods the market in all departments was very tame. The month of October was disappointing as to the amount of business done, and was made further uncomfortable

by the large blocks of merchandise forced off at public sale in consequence of several important failures. The cotton market is in rather better shape, but is dull and lower, both for spot and future. Coffee is firmly held on a basis of 12 1/2¢ for fair cargoes. Manila Cordage is quoted 16¢ @ 17¢; Sisal, 10 1/2¢. Leather is steady; exports moderate. Molasses is firm. Oils are quiet; lard oil advanced. Petroleum is steady, with trading light and tame advices from the other side. Provisions—mess pork very dull, but holders firm at \$11.75 per barrel for ordinary. Beef firm. Lard is advanced on account of buoyancy in grain, but the export demand is light. In rice there is a fair trade at firm prices. Sugars are quiet and quoted at 6 1/2¢ for fair refining. Tobacco firm. Spirits of turpentine advanced. Wool unchanged. In ocean freights there is less doing, the sharp rise in wheat and corn impeding export dealing, while a fair movement is noted in flour, cotton and provisions.

MINING STOCKS.

The closing prices for mining stocks were as follows:

	Bid.	Asked.
Am. Flag	2	11
Amie	2	12
Alce	2.50	2.00
Alta Mont	2	—
Bechtel	2	—
Belle Isle	35	45
Bulwer	50	55
Bassick	9.00	—
Bull Domingo	7	—
Barcelona	20	—
Caled. B. H.	20	—
Climax	4	7
Con. Va.	45	47
Chrysolite	1.15	1.20
Central Ariz.	15	25
Cherokee	2	4
Dahlonaga	2	—
Dunkin	30	—
Ducatur	3	4
Eureka Con.	3.50	—
East Oregon	40	—
Elko Con.	18	21
Father de Smet	3.70	—
Grand Prize	50	—
Great Eastern	1	2
Green Mountain	75	80
Am. Coal Co.	30	60
Castle Creek	1.15	1.20
Gold Strike	3	5
Harlem	97	98
Homestake	12.50	—
Hukill	4	6
Horn Silver	5 1/2	—
Idaho	10	—
Independence	25	40
Iron Silver	2.05	3.00
Lacrosse	9	9
Leadville Con.	44	—
Maryland Central	10	—
Little Chief	50	60
Mexican	3.25	—
Navajo	4.25	—
N. Standard	14	—
S. Belle	25	—
N. Belle Isle	50	60
Ori. and Mil.	5	—
Pipe Line cer.	1.09 1/2	1.10
Rappahannock	8	—
Robinson Con.	45	47
Rising Sun	3	—
Red Elephant	6	—
Sierra Grand	90	98
Sierra Nev.	3.65	3.75
Sonora Con.	25	30
Silver King	7.00	—
Sutro Tun.	15	16
Stormont	30	—
Union Con.	3.50	—
Unadilla	1	—
Ophir	1	5 1/4
Hale and Nor.	1.60	2.25

GENERAL HARDWARE.

A comparison of the volume of business for October with that of the same month last year indicates that there has been no material falling off, but that an average amount of goods has been disposed of. The demand is continuing with fair steadiness, a great many small orders still coming in. That the stocks in dealers' hands are small and broken is indicated by the frequency and urgency of their orders, the goods being in most cases wanted at once, and usually by express. These orders are in many cases for small quantities, so that the merchants here and manufacturers are apt to complain that they have to carry the stocks for their customers; yet the aggregate of such business is considerable, and foots up more than the sellers anticipated. The volume of trade for the past week has been somewhat affected by the elections in the different States, but the condition of the market has not materially altered since our last report. The export demand during the season has been good, and houses with trade abroad are in most cases well occupied.

We are not called upon to record important changes of prices, most manufacturers holding firmly to former rates. In not a few lines there are complaints, unquestionably well founded, of unduly reduced profits, and it will not be a matter for surprise if in some departments of trade the manufacturers should come to an agreement as to rates and advance prices somewhat. But at the present season not many changes are to be anticipated. It remains to be seen whether the gradual shrinkage in prices will continue during the winter months, or under limited production and an increased demand better prices be realized.

The demand for Nails has been fair, but the supply is now growing better, which indicates production is overtaking consumption. Nobody anticipates any immediate fall in prices, and large buyers have been feeling the market the past week with bids slightly under ruling rates without success. Much depends upon the action of the Western Nail Association next Wednesday. If they conclude to stop their factories for a few weeks, prices will be stiffened here as well as in the West. But if they determine to continue production, there will soon be too many Nails in the country to sustain present prices. We quote \$2.90 for small lots and \$2.85 for lots of 100 kegs or over.

The effect of the restricted output of Barb Wire, which was referred to in our last week's report, is being felt in the increased demand upon some of the works which continue in operation. At least one of the largest has been obliged to start up overtime

again, although but a short time ago it was not supposed that this would be necessary until spring. A meeting is being held in Chicago to-day of Barb-Wire makers, to take action toward forming a combination. As a number of the manufacturers would not enter into such an arrangement unless confident it would be permanent, it is doubtful if anything will be settled for some time yet. Some arrangement will probably be made before spring trade fairly commences to put prices on a more remunerative basis. We continue to quote 7 1/2 cents per pound for ordinary lots, and 6 cents per pound for large lots.

The demand for Glass continues large, and in spite of extensive arrivals the stocks are small. The prices have still further stiffened, and we now quote discount 60 and 15 percent, as representing the market, sales being made above and below this figure. The feeling is decidedly in the sellers' favor.

American manufacturers, if reports be true, need to be more careful of the quality of the Edge Tools which they are exporting. Advices from Sheffield are to the effect that orders are being placed there by English colonists who have hitherto been large customers of American houses. They accompany their orders with expressions of dissatisfaction with the tools recently received by them from the United States. There can be but little excuse for lowering the quality of Steel goods now, since raw materials are very much lower in price than they have been for several years. It would seem, on the contrary, that manufacturers should be able to embrace the opportunity afforded them to secure, at reasonable rates, the very best material, and thus establish for themselves even a higher reputation than they have yet earned. Now is the time to cultivate external trade, not to kill it.

We are reminded in this connection of a personal experience not many years ago. We obtained from an American manufacturer a Hatchet of passable appearance, which was of the kind that he was exporting in considerable quantities. Although this manufacturer had a reputation for turning out reliable goods, and the Hatchet in question was marked "cast steel," the blade broke off at the first attempt to cut a piece of kindling wood, the fracture disclosing all the characteristics of cast-iron. Such goods are well calculated to bring American manufactures into complete discredit, as the foreigner who has bought an American Hatchet branded "cast steel," and finds it is only cast iron, will very probably class all American manufactures as equally unreliable. Within a year a manufacturer residing in the vicinity of this city came to one of the English steel houses to purchase a cheap grade of steel for the manufacture of a Hardware article for the English market. The importer suggested that it would be the part of wisdom to use at least fair material in the manufacture of the goods, which, if of good quality, would, in his judgment, command a ready and continued sale. The lowest grade of steel was, however, purchased, and the goods made and shipped; but, although sufficient time has elapsed for new orders, they have not been received. The article, if of good quality, would have been saleable, but it has not been heard from, and the market is lost to it.

There is, on the other hand, we are happy to say, ample evidence that most of the goods exported from the United States are of the finest quality. Our Saws, Axes and Mechanics' Tools generally are equal to the most exacting requirements, as English competitors unwillingly admit.

A true story is told of a Scotch carpenter who had removed to this country, and who found much fault with the tools he obtained here. Learning that an acquaintance was about to sail for Glasgow on a short visit, the carpenter commissioned him to bring back a set of the best Chisels to be procured there. He boasted to his fellow-workmen almost daily of the fine Chisels he would be able to show them on the return of his friend. In due time the Chisels were handed him, with the remark that "they were the very best Chisels to be found in Glasgow." In the presence of his fellow-workmen he opened the package, and with great satisfaction passed the tools around for examination. To his consternation and the delight of the crowd, the Chisels bore a well-known American brand. That was several years ago, since which time many lines of American Hardware have made a place for themselves in English and Continental markets, but a recent occurrence illustrates the same point. An American lady recently mentioned to us that, after the completion of her tour on the Continent, she was at Sheffield, and desired to bring home from there a very choice pair of Scissors. One after another superior styles were displayed for her inspection, until an elegant article, stamped "Newark, N. J.," was offered as the finest and best of them all.

Wylor & Co.	Sheathing, cs., 80
Spiegel, tons, 100	Ing. cs., 80
Wylor, Benson & Co.	Tiemann D. F.
Nail sheets, bdls., 14	Zinc oxide, bdls., 60
Spiegel, tons, 140	Order,
Wylor & Co.	Tin plates, bxs.,
Wire rods, coils, 547	11.3.5
Bundles, 41	Tin, slabs, 1451
Benson Geo. W.	Lead, pos., 1545
Pigs, tons, 200	Spelter, pigs, 1815
Williamson Jas. & Co.	Spelter dust, cks., 18

EXPORTS

Of Hardware, Iron, Machinery, Metals,
 &c., from the Port of New York, for the
 week ending November 6, 1883.

Dutch West Indies. British East Indies.

Quam. Val.	Quam. Val.
Pdm., gals., 4590 \$577	Pumps, pkgs., 7 \$148
Mf. iron, pkgs., 8 93	Fontain., 1 90
Mach'y, pkgs., 4 2,215	Tacks, cs., 3 44
Bel., 1 21	Nails, kegs., 506 1,892
Buckles, cs., 2 60	Boiler, 1 2,100
Scissors, cs., 8 81	
Clocks, bxs., 7 32	
Hdw., 1 50	

Dutch East Indies.

Pdm., gals., 385,000 36,575	
Bremen, 1 50	
Pdm., gals., 708,804 55,351	
Hdw., cs., 32 1,094	
Sew. ma., cs., 8 240	
Ag. imp., pkgs., 2 50	
Mach'y, pkgs., 1 50	
Pz. pre's, bxs., 18 600	
Mf. iron, pkgs., 1 50	

Amsterdam.

Pz. pre's, pkgs., 2 658	
Hdw., pkgs., 47 1,098	
Tin, bxs., 1 71	
Clocks, case., 1 71	
Pumps, pkgs., 5 350	

Rotterdam.

Pdm., gals., 190,400 17,756	
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Hamburg.

I. rolls, case., 1 40	
Guns, case., 1 37	
Ag. imp., pkgs., 55 890	
Pumps, pkgs., 2 40	
Hdw., pkgs., 84 219	
Saws, 1 37	
Mach'y, pkgs., 36 4,153	
Pdm., gals., 232,000 23,000	
Clocks, cs., 76 1,764	
Sew. ma., cs., 1740 37,307	

Christiana.

Hdw., cs., 73 350	
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Copenhagen.

Mach'y, pkgs., 1 135	
Hdw., pkgs., 11 350	

Liverpool.

Hdw., pkgs., 38 875	
Copper, bars, 133 5,834	
Scissors, bxs., 21 260	
Mf. iron, pkgs., 2 152	
Coat. mat., bxs., 500 6,000	
Clocks, pkgs., 195 3,643	
Ag. imp., pkgs., 4 190	
Carriages, cs., 150 25,500	
Sew. ma., cs., 14 312	
Nickelplate, cs., 3 115	
Ore, case., 1 35	
Pdm., gals., 138,190 30,520	

Antwerp.

Mach'y, pkgs., 2 604	
Pdm., gals., 378,270 25,050	

Glasgow.

Pdm., gals., 222,385 17,500	
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Great Yarmouth.

Pdm., gals., 140,550 12,150	
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Hull.

Mach'y, pkgs., 1 180	
Hdw., pkgs., 229 3,332	
Ag. imp., pkgs., 2 140	

Bristol.

Pdm., gals., 181,045,244 88,245	
Roller mill, 1 2,000	

London.

S. rollers, pkgs., 125 500	
Pumps, pkgs., 3 175	
Pdm., gals., 376,184 37,879	
Sew. ma., cs., 13 1,429	
Hdw., pkgs., 140 4,921	
Scissors, cs., 13 605	
Iron safes, 1 30	
Clocks, bxs., 406 12,806	
Mach'y, pkgs., 14 1,834	
Saws, 1 74	
Wringers, cs., 1 30	
Ag. imp., pkgs., 85 1,259	
Carriages, cs., 1 30	
Mf. iron, pkgs., 9 300	

Glasgow.

Hdw., pkgs., 8 530	
Boiler, 1 145	
Ag. imp., pkgs., 6 345	
Clocks, cs., 1 140	
Saws, 1 57	
Mach'y, pkgs., 66 1,400	
Mf. iron, pkgs., 13 82	

British West Indies.

Scale, 1 20	
Mf. iron, pkgs., 100 540	
Carriages, cs., 2 30	
Pdm., gals., 37,000 905	
Hdw., pkgs., 1 30	
Mach'y, pkgs., 1 73	
Nails, kegs., 8 35	

New Zealand.

Hdw., cs., 2 100	
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British Australia.

Wringers, cs., 40 879	
Ag. imp., pkgs., 11 155	
Saws, case., 1 239	
Guns, 1 30	
Mf. iron, pkgs., 100 2,843	
Sew. ma., cs., 201 4,234	
Nails, cs., 3 83	
Revolvers, cs., 1 86	
Pdm., gals., 38,390 8,006	
Clocks, bxs., 255 3,414	
Hdw., pkgs., 674 10,551	
Axles, cs., 31 1,169	
Carriages, cs., 1 814	
Cutlery, cs., 32 395	
Nickel, case., 1 100	
Carbines, cs., 3 360	

New Brunswick.

Pdm., gals., 51,250 5,325	
Pig iron, tons, 100 2,105	
Ag. imp., pkgs., 3 34	

Havre.

Pumps, pkgs., 7 400	
Ag. imp., pkgs., 140 7,103	
Copper, pkgs., 690 32,000	
Pumps, cs., 3 65	
Tacks, cs., 80 875	
Mach'y, pkgs., 12 3,230	
Pdm., gals., 409,074 34,536	

St. Louis.

Pdm., gals., 371,650 30,500	
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Rouen.

Pdm., gals., 345,000 25,300	
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Les Sables D'Olonne.

Pdm., gals., 134,862 8,736	
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Dunkirk.

Pdm., gals., 608,037 40,404	
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Marseilles.

Clocks, bxs., 15 250	
Pdm., gals., 221,315 14,411	
Ag. imp., pkgs., 8 300	

Cette.

Pdm., gals., 219,553 17,390	
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French West Indies.

Pdm., gals., 2,000 207	
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Malaga.

Pdm., gals., 166,498 10,120	
Sew. ma., cs., 1 28	

Cuba.

Mach'y, pkgs., 139,015 73,011	
Hdw., pkgs., 103 8,053	
Mf. iron, pkgs., 248 4,621	
Copper, sheets, 4 23	
R. R. bars, 118 7,343	
Clocks, cs., 3 45	
Meters, cs., 4 480	
Wt. scales, 71 142	
Wt. scales, 25 250	
Nails, cs., 34 448	
Cutlery, cs., 37 266	
Tin, case., 1 60	
Valves, cs., 5 135	
Wire cloth, case, 1 67	
Ag. imp., pkgs., 18 519	
Pdm., gals., 160 353	
Sew. ma., cs., 17 410	

FOREIGN TRADE MOVEMENTS.

Included in the imports for the week ending November 2 were the following articles of merchandise valued as follows:

Articles	Quantities	Value
Anvils, 32	\$440	
Brass goods, 77	6,835	
Bronzes, 55	7,814	
Chains and anchors, 6	655	
Clocks, 111	13,098	
Copper, 592		
Cutlery, 82	27,023	
Guns, 112	19,227	
Hardware, 31	1,021	
Iron, pig, tons, 3,044	34,797	
Iron, sheet, tons, 66	4,750	
Iron tubes, 550	1,238	
Iron, cotton ties, 4,564	4,918	
Iron, other, tons, 1,617	60,576	
Metal goods, 210	35,734	
Machinery, 123	9,842	
Nails, 1	7	
Needles, 14	6,255	
Nickel, 6	4,131	
Old metal, 2	1,133	
Platina, 1	1,133	
Platedware, 5	575	
Pins, 33	2,087	
Saddlery, 28,993	50,084	
Steel, pkgs., 191	255	
Steel blooms, 11	1,333	
Silverware, 11	1,333	
Tin, bxs., 85,013	161,394	
Wire, 210	35,734	
Zinc, 62,615	2,512	

The imports of hardware and metals compare with previous dates as follows:

For the week of 1883.	13 weeks of 1883.	Same time 1882.
Cutlery, pkgs., 82	6,472	6,347
Hardware, pkgs., 32	1,015	885
Iron, R. R., bars, 10,789	80,629	
Lead, pkgs., 23,003	10,479	25,853
Steel, pkgs., 23,003	2,401,291	1,888,331
Tin, bxs., 35,012	1,389,150	1,881,780
Tin slabs, lbs., 20,097,350	17,501,136	

COAL.

Coal authorities agree that November opens well for the Anthracite trade. Complaints of dullness are seldom heard, although with the present liberal output they think there is little chance of prices hardening. The production is now over two and one-quarter millions of tons in excess of last year. A restriction in December is sometimes spoken of as positive, but we learn that nothing has been agreed upon as yet in this respect. With most of the companies prices are a little off, special Coals excepted. The Pennsylvania Coal Company report the demand quite active for manufacturing sizes, giving their working force full employment. In the general market there is not yet a complete recovery from the heavy low-price sales of about October 1. Bituminous Coal is unchanged at about \$4 @ \$4.25 alongside for Cumberland. Production is heavy. The Pottsville Miners' Journal says: "The furnace sizes are dull, and will remain so until there is an improvement in the Pig-Iron trade, of which there is no immediate prospect." The total amount of Anthracite coal taken to market for the week ending October 27, as reported by the several carrying companies, was 756,354 tons, compared with 696,597 tons in the corresponding week last year, an increase of 59,757 tons.

OLD METALS, PAPER STOCK, &c.

Purchasing prices offered by dealers are as follows:

Copper, heavy, 1 lb.	\$0.12 @
" light, 1 lb.	" 0.10 @
Copper Bottoms, 1 lb.	" 0.10 @
Yellow Metal, 1 lb.	" 0.07 @
Brass, heavy, 1 lb.	" 0.09 @
" light, 1 lb.	" 0.07 @
Composition, heavy, 1 lb.	" 0.11 @
Lead, heavy, 1 lb.	" 0.03 @
Tea Lead, 1 lb.	" 0.03 @
Zinc, 1 lb.	" 0.03 @
Pewter, No. 1, 1 lb.	" 0.14 @
" No. 2, 1 lb.	" 0.14 @
Wrought Iron, 1 ton, 22.00	@
Licet, 1 lb.	" 11.50 @ 12.50
Stove Plate Iron, 1 lb.	" 11.00 @ 11.50
Machinery, 1 lb.	" 14.50 @ 15.00
Grate Bars, 1 lb.	" 4.50 @
Stereotype Plates, 1 lb.	" 0.04 @ 0.04 1/2
Electrotype, 1 lb.	" 0.04 @
Small Type, 1 lb.	" 0.05 @

The prices current (prices paid by local dealers) for Rags, &c., are as follows:

Canvas, Linen, 1 lb.	3 1/2 @
White Cotton, No. 1, 1 lb.	" 3 1/2 @
" No. 2, 1 lb.	" 3 1/2 @
White, No. 1, 1 lb.	" 3 1/2 @
" No. 2, 1 lb.	" 3 1/2 @
Soft Woollens, 1 lb.	" 5 1/2 @ 6 1/2
Mixed Rags, 1 lb.	" 1 1/2 @ 1 3/4
Munny Bagging, 1 lb.	" 1 1/2 @
Grate Butts, 1 lb.	" 3 1/2 @ 3 3/4
Kentucky Bagging, 1 lb.	" 3 1/2 @ 3 3/4
Book Stock, 1 lb.	" 1 1/2 @ 1 3/4
Newspapers, 1 lb.	" 1 @
Waste Paper and Scraps, 1 lb.	" 1 1/2 @
Kentucky Bale Rope, 1 lb.	" 3 1/2 @ 4

PHILADELPHIA.

Office of The Iron Age, 220 South Fourth St., Philadelphia, November 6, 1883.

Pig Iron.—There is not much change to notice, although the market is gradually assuming a more settled condition, and prices becoming more uniform and definite. This is due not so much to any general increase in the demand, but to the absorption of most of the low-priced lots by Pipe founders, and in endeavors by the same parties to make still further engagements for forward delivery. Hence anything of fair quality at less than \$18, delivered, for Gray Forge or plain No. 2, is now quite exceptional, and that may be considered a rock-bottom quotation. Foundry Irons, on the other hand, have been marked down a trifle, so that it is not unlikely that the water has been pretty well squeezed out of the entire market. This feeling seems to have gained ground within the past 10 or 15 days, and while consumers show no anxiety in regard to the future, there is a general impression that the next turn in the market will be in sellers' favor. The dullness in Finished Iron and the general inactivity in business tend to repress speculation, however, and it may become time yet before the position can be fully developed. As intimated in last week's article, it is now pretty well ascertained that stocks have been decreasing for some time past, while such as are being carried are in the hands of strong parties; so far, therefore, the market may be considered to be in a strong position, but there is still the question of consumption to be considered. Complaints on this head have been general for months past, and as regards Finished Iron the outlook at the moment is far from encouraging; stocks have been run so low, however, in anticipation of lower prices, that even with only a moderate consumption the demand may not fall much, if any, below what it has averaged the past six months. On the whole, therefore, the market is probably in better shape than it has been for several months past, for the reasons already advanced, viz.: 1st, the absorption of all the low-priced lots; 2d, an active demand at same or a little better prices for forward deliveries; 3d, the marking down in quotations of Foundry Irons to solid figures; 4th, stocks on furnace banks held by strong parties, and 5th, increasing evidence that the output is below rather than in excess of consumptive requirements. Sales during the week have been mostly in small lots, at prices varying from \$20.50 to \$22 for No. 1 Foundry Irons, \$19 @ \$20 for No. 2, and \$18 @ \$20 for Gray Forge, all delivered at tidewater. Large lots of the lower grades could have been placed, but sellers are somewhat firmer in their ideas of values, besides which stocks have been pretty well cleaned up.

Foreign Iron.—The market is very quiet, with no inquiries likely to lead to immediate business, although, in view of the recent heavy transactions in Steel Rails, sellers are rather more hopeful of something being done. Bessemer is offered for shipment at \$20.50, and 20 % Spiegeleisen at \$30.50, with a possibility that bids at slightly lower figures might be accepted.

Muck Bars.—The market is very dull, and sellers are prepared to shade prices at least 50¢ per ton, as compared with last week's quotations. Sales at \$33 @ \$33.50 at mill, with only a moderate demand.

Blooms.—Market extremely dull, and only small lots taken at about the following quotations: Charcoal Blooms, \$55 @ \$57; Run-out Anthracite, \$47.50; Scrap Blooms, \$42 @ \$43; Northern Ore Blooms, \$39.50 @ \$41.50.

Bar Iron.—Business is extremely dull, and gives not the slightest indication of early improvement. Prices have been cut down to the lowest point, but there is no increase in demand whatever; all the mills are running from a third to a half below their full capacity, and, even then, find it somewhat difficult to secure orders. There is nothing in the outlook to denote any material change in the position, and it is probable that for the balance of the year business will remain much as it has been during the past six months. There are somewhat sanguine anticipations of a better demand after the holidays; otherwise, suspension of work at the mills will be of longer duration than usual. Quotations for Refined Bars remain at 2 1/2 @ 2 3/4, although a good deal of Iron is selling at less money, quality probably in proportion to price.

Plate and Tank Iron.—The demand has been somewhat disappointing of late, and prices have been gradually shaded down. The recent contract for four new Iron steamships will help the market, however, as something like 2000 tons Plate Iron will be required, which will give the mills a nice lift during the winter months. This order has been in sight for some time, and, in fact, was referred to in this article a month ago, so that it is not an entirely new matter. Apart from the shipyard demand, there is very little doing except in small lots, and while prices are nominally unchanged, concessions have been granted on specially desirable orders. Asking prices are about as follows, viz.: Tank Iron, 2 5/8; Boat Plate, 2 3/8 @ 2 1/2; Shell, 3/8 @ 3 1/2; Flange, 4/8 @ 4 1/2, and Fire-Box, 5/8 @ 5 1/2.

Structural Iron.—The demand for small lots keeps up fairly, but manufacturers are steadily gaining on their orders, so that there is some anxiety to secure new contracts as soon as possible. There is nothing in the immediate outlook to indicate any change in the position, although it is thought that after the holidays there may be a larger demand. Prices are somewhat easier, as follows: Double-Refined Bars, 2 1/2 @ 2 1/2; Bridge Plates, 2 5/8; Angles, 2 3/8 @ 2 1/2; Tees, 2 1/2 @ 3/8; Beams and Channels, 3 1/2.

Sheet Iron.—There has been some improvement in the demand for Thin Sheets, and manufacturers begin to find themselves somewhat crowded to meet the demand promptly. Heavy Sheets are slow of sale, however, and, while not quotably lower, are easier to buy. For small lots we quote as before, viz.:

Common Sheets, No. 28, 4 1/2	@
Best Bloom Sheets, Nos. 28 to 32, 4 1/2	@
Common Sheets, Nos. 21 to 25, 3 1/2	@
Common Sheets, Nos. 18 to 20, 3 1/2	@

Best Refined, 1/2 advance on the above.

Best Bloom Sheets, Nos. 28 to 32, 4 1/2	@
Best Bloom Sheets, Nos. 21 to 25, 3 1/2	@
Common Ref. Plates, 3 1/2 to 16, 2 1/2	@
Blue Annealed, 1 1/2 @ 1 3/4	@
Best quality, discount, 50¢	

Wrought Iron Pipe.—Since our last writing the market has worn a somewhat more cheerful appearance, and a satisfactory amount of business has been transacted. As regards actual prices, however, there is little improvement to note. Discounts on Gas and Steam Pipe may be quoted at about 70 % and 10 % off list prices, and Boiler Tubes 62 1/2 % off.

Nails.—The demand for Nails shows very little falling off, and stocks appear to be still light. Prices are a trifle weaker, however, owing to some new brands of Nails being offered at very low figures. The usual retail price appears to be from \$2.85 to \$2.90.

Steel Rails.—The market is a little more settled than it has been, prices having reached what are considered bottom figures. Ordinarily quotations remain as before, \$37 at mill, but for winter work orders could probably be placed at \$35 @ \$36, several large lots for December and January having been taken at \$35 at mill. There is decidedly more inquiry, however, and although prices are likely to rule low, it is thought that at these prices the mills will be kept fully employed during the winter months.

Old Rails.—There is more business doing and prices are somewhat firmer. A 100-ton lot of 4-inch Old T's was sold to-day at a trifle over \$24, although ordinary Rails could be had at less money—say, \$23.50, and Double Heads at about \$25.

Scrap Iron.—Market very quiet and prices rather easier—say, \$23 for cargo lots; \$24.50 @ \$25 for choice heavy, and \$16 @ \$18 for Cast.

The Cornwall Ore Bank Company have appointed Mr. Ethelbert Watts their sales agent, whose office will be at 220 South

Third street, Philadelphia. The price for selected

class of iron here, and those who handle it are not inclined to import more before next spring. What there is on hand is held firm, as follows: Coltness, \$29; Summerlee, \$25; and Glengarnock, \$28; these prices are for cash, and, it is said, cannot be discounted.

Merchant Steel.—The demand for steel continues about as it has been for the past month. In the higher grades of steel there is no probability of lower prices, as we are informed that it cannot be made for less money without sacrificing quality, which manufacturers are unwilling to do on established brands. In the lower grades or less established brands prices are very irregular, and competition so great that sales are almost without profit. The demand has improved some during the week, but the change is scarcely worth mentioning. We continue our former quotations for the best grades of established steel, as follows: Refined Cast Steel, 10½¢ @ 11½¢ per lb; Crucible Machinery, 6½¢ @ 7¢; Bessemer and Open hearth do, 4½¢ @ 5¢; Steel Boiler Plate, 6¢ @ 6¼¢.

Old Rails.—The old rail market has become firmer during the week, and stock plentiful. Rolling mills are paying from \$21 to \$22, Chicago or Milwaukee delivery, and thus far have been able to secure a sufficiency at these figures, which are a small advance on last week's quotations.

Car Wheels.—Manufacturers of car wheels report a particularly brisk business for immediate use. Orders are principally from Western roads and at fair prices.

Old Car Wheels.—The market seems well supplied with old wheels, many of which are taken in exchange for new ones by manufacturers. When sold for cash they are worth \$18.50 per ton of 22½ lb at the foundry.

Bar Iron.—While some of the dealers are complaining of dullness in the Merchant Iron trade, there are no indications of it with others. Consumers are paying considerable attention to quality, and to this fact is attributed the quietness prevailing in certain establishments. Much iron which has been sold for "new puddled" during the past three months has failed to stand the test, which gives a great advantage to what is really first-class iron. In the latter class there is a brisk demand in small lots, which command \$2 @ \$2.10 rates from store, while larger orders and specifications are placed at concessions ranging from 10¢ to 15¢ less. These figures are pretty firm, and very little disposition is shown to cut.

Builders' Iron.—There is not much doing in this class of iron at present, compared with a month ago. The trade is not what would be termed dull, but the heaviest part of the season's business is past. There are numerous contracts under way which are keeping some of the foundries hard at work, and will likely remain so through the winter. Outside of these special things trade has fallen off in accordance with the advancement of the season. We continue to quote Tank, 2.7¢; Angles, 2.9¢; Beams, 3.6¢; and Channels, 3.6¢ @ 3.8¢.

Galvanized Iron.—The market remains in about the same condition as at our last report. There is something doing all the time in a small way, but scarcely enough to be called a medium demand. Prices remain unchanged. Juniata is quoted at 45 and 5¢ off, and Refined at 45 and 10¢ off, with the customary shading for desirable quantities.

Black Sheets.—There is very little to be said in favor of the Black Sheet market. The Stove-Pipe trade is the strongest line of consumption at this time and the lighter quantities are in fair request, with an average demand for other numbers. We quote 24 at \$3.50, Nos. 25 and 26 at \$3.65, and No. 27 at \$3.80. These prices are actually well sustained, but we hear of sales at much lower figures in carload lots.

Scrap Iron.—There seems to be an abundance of scrap in the market just now. Furnaces are very choice in their selections, and are not using anything but the best grade of No. 1 Mill Scrap, for which they pay from \$18.50 to \$19 per ton, Chicago or Milwaukee delivery. The following prices are quoted as dealers' purchasing prices: No. 1 Wrought Scrap, per net ton, \$17.50; Cast Scrap, per ton, \$15; No. 1 Stove Plate Scrap, per ton, \$10; Wrought Turnings, per ton, \$9; Cast Iron Borings, \$6; Old Plovs and Plow Steel, \$10; Malleable Scrap, \$5.

EVERETT & POST, 156 Lake street, Chicago, report to us as follows, under date of November 3, 1883: **Pig Iron.**—Owing to unsettled condition of the New York Lead market, it is almost impossible to arrive at a correct quotation for Pig Lead in this market. During the first of the week there were sales of some 240 tons Common at \$3.85, Chicago, but latterly prices have ranged from \$3.77½ to \$3.82½, according to brand and delivery.

CHATTANOOGA.

Office of *The Iron Age*, Market and 8th Sts., CHATTANOOGA, NOV. 5, 1883.

The rains and decidedly cool weather of the past week have lived up some lines of trade perceptibly. Several furnaces depending on water transportation have been forced to bank up several times during the fall, as boats could not do business half the time. The streams are now well filled and will probably remain at good tide for the balance of the season. The cold nights are helping the wooden goods and clothing trades. Manufacturers in all other lines than iron are running flush and making money.

Pig Iron.—There is nothing of interest to report. Trade drags along after the style that seems to have become chronic. The large producers have come to the conclusion that prices must not go lower. They will stop making iron rather than make further concessions. We continue quotations, with the explanation that only small lots bring full figures, while larger ones get liberal shadings, as do old customers. We quote No. 1 Foundry, \$19 @ \$20; No. 2 Foundry, \$18 @ \$19; Gray Forge, \$16 @ \$17; White and Mottled, \$14 @ \$15; Car-wheel Metal, \$24 @ \$26.

ORES.—We quote 50% Brown Hematite, per ton, \$1 @ \$2.75; Red Fossil, \$2 @ \$2.25, delivered at furnace.

Miscellaneous Articles.—Old Rails are strong at \$21 @ \$22. Supplies are light. Scraps are not sought. Choice Wrought goes at full figures, though there is little demand, and holders are not pushing their stocks on the market. Wrought Scrap, \$18 @ \$22; Cast Scrap, \$11 @ \$14; Old Wheels, nominal, \$22.

Nails.—Are steady at \$2.75 for large bills; 10¢ @ 15¢ higher for small lots.

Merchant Iron.—Bar is rather dull at \$2 as an outside quotation for large bills. It is said agents of Pittsburgh, Wheeling and Southern Ohio mills are offering to lay down Refined Bars in assorted lots at \$1.90. We quote Bolts, \$3 @ \$3.20; Spikes, \$2.60; Splices, \$2.

Coal.—We quote Fancy Lump, \$3; Common, \$2.50; run of mine to manufacturers, \$1.50 at mills.

Coke.—We quote Furnace Coke, \$3 at point of consumption; Foundry, 10¢ @ 12¢ per bushel.

LOUISVILLE.

GEO. H. HULL & Co., Commission Merchants, report to us as follows, under date of Nov. 3, 1883: The general market continues about the same as our last quotations, except some sales of round lots, on which special concessions have been made. Our prices continue unchanged:

FOUNDRY IRON.	
No. 1 Hanging Rock Charcoal.....	\$23.50 @ \$24.50
No. 1 Southern Charcoal.....	21.50 @ 22.00
No. 1 Hanging Rock Stone-coal and Coke.....	19.50 @ 20.50
No. 1 Southern Stone-coal and Coke.....	18.50 @ 19.00
No. 2 Southern Stone-coal and Coke.....	18.50 @ 19.00
Open Silver Gray.....	17.50 @ 18.00
Close Silver Gray.....	16.50 @ 17.00

MILL IRONS.	
No. 1 Charcoal.....	19.00 @ 20.00
No. 1 Stone-coal and Coke, Neutral.....	17.00 @ 17.50
No. 2.....	16.50 @ 17.00
No. 1.....	16.50 @ 17.00
No. 2.....	16.00 @ 16.50
White and Mottled, Cold-short and Neutral.....	15.00 @ 15.50

CAR WHEEL IRONS.	
Hanging Rock, Cold-blast.....	30.00 @ 31.00
Warm-blast.....	28.00 @ 29.00
Alabama and Georgia, Warm and Cold-blast.....	27.00 @ 28.00
Central Kentucky, Cold-blast.....	26.50 @ 27.00

W. B. BELKNAP & Co, Iron and Steel Merchants, Nos. 115 to 121 West Main street, report to us as follows, under date of November 2, 1883: There has been no change in Bar Iron since last report. The demand is confined to such as is actually needed for consumption, and this does not seem to be very much. There seem to be more new tires going on old than on new wagons. Prices on Nails are firm, and the mills report large sales and no stocks. The Exposition, which has advertised the city as it never was before, closes on the 10th inst.

ST. LOUIS.

HOFFER & Co., Pig Iron and Iron Ore Merchants, 214 Pipe street, report to us as follows, under date of Nov. 3, 1883: The condition of this market and prices remain about the same as last reported. Old Wheels are selling at \$17 @ \$18; Old Rails at \$21 @ \$22. Quotations are:

HOT-BLAST CHARCOAL IRONS.	
Missouri.....	\$19.50 @ 20.50
Southern.....	20.00 @ 22.10
Ohio.....	24.00 @ 26.00

COAL AND COKE IRONS.	
Missouri.....	19.50 @ 20.50
Southern.....	18.50 @ 19.50
Ohio.....	21.00 @ 25.00

MILL IRONS.	
Red-short.....	18.00 @ 19.50
Neutral.....	17.00 @ 18.00

CAR WHEEL AND MALLEABLE IRONS.	
Missouri.....	19.50 @ 21.00
Southern.....	23.00 @ 25.00
Ohio.....	23.00 @ 25.00

BALTIMORE.

W. N. WYETH, Iron and Steel Merchant, 46 and 48 South Charles street, reports to us the following, under date of Nov. 5, 1883: We have to report a quiet and unsettled market for the past week, with values ruling shaded, at annexed figures:

Ref. Bar Iron, 1 to 6 x ¾ to 1.....	\$21.10 @ 22.10
" 1 to 4½ x 1½ to 1.....	21.10 @ 22.10
" ¾ to 2, Round.....	21.10 @ 22.10
and Square.....	21.10 @ 22.10
Hoop Iron, 1½ wide and upward.....	3.10 @ 3.10
Band Iron, from 1½ to 6 in. wide.....	2.60 @ 2.60
Horse-shoe Iron.....	3.20 @ 3.30
Norway Nail Rods.....	3.50 @ 3.50
Black Diamond Cast Steel.....	11 @ 12
Machinery Steel.....	4.50 @ 5
Spring Steel.....	4 @ 4.50
Common Horse Nails.....	10 @ 11
Railroad Spikes, 5½ x 9-10.....	2.60 @ 2.70
Perkins' Horse Shoes, ¾ keg of 100 lb.....	\$4.37½
Mule Shoes.....	5.37½

Ancient and Modern Time-Keepers.

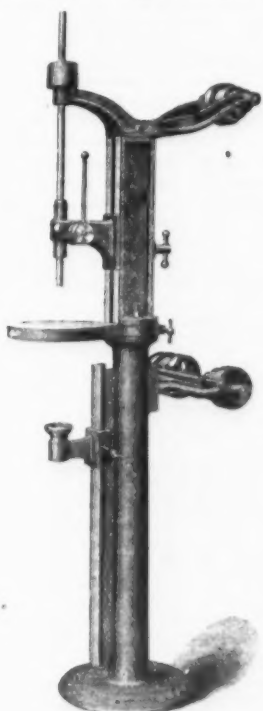
Indifferent time-keepers as were the "pocket clocks" of the Middle Ages, no one individual appears to have been responsible for the machine as a whole. Was it from an Italian or a German brain that the equivalent of our modern watch was first evolved? The credit of the invention belongs to one or the other. Gaspar Visconti, an Italian poet, writing during the final decade of the fifteenth century, sings of "certain small and portable clocks made with a little ingenuity, which are constantly going, showing the hours, many courses of the planets, the festivals, and striking when the time requires it." That was nearly a hundred years before the melancholy Jacques, in Shakespeare's "As You Like It," "met a fool in the forest," the same fool that "drew a dial from his poke, and, looking on it with lack-luster eyes, says very wisely, 'It is ten o'clock.'" The Shakespearean commentators have even now not decided what kind of dial it was that the fool first and Jacques afterward moralized on. Mr. Halliwell conjectures that it may have been the "common ring dial" of the period. Another learned author surmises that the fool's time-keeper was probably similar to the elaborate octagonal silver pocket dial preserved in the collection of the Honorable Company of Clockmakers. It may, however, just as likely have been one of the Italian "small and portable clocks" mentioned by Visconti, or even one of the earlier regular watches of German manufacture.

Peter Hele, of Nuremberg, made a pocket clock within five years of the composition of

Gaspar Visconti's sonnet. Hele, at that time a young man, is described by a contemporary writer as the maker of works "which even the most learned mathematicians admire, for he fabricates small horologies of iron fitted with many wheels, which, whithersoever they are turned, and without any weight, both show and strike the hours, whether they be carried in the bosom or the pocket." Shakespeare may have known of, or even seen, one of the "Nuremberg living eggs," as they were called, or a French table-watch, with a bell on top for striking—possibly the "strike upon the bell" of Macbeth—or even an Italian watch of the earliest manufacture. Considering to what extent the poet was indebted to the Italian novelists, Bandello and Luigi da Porta, Visconti's sonnet may not have escaped him. Watches, both oval and round, the latter not at all unlike, in outward appearance, to the modern lever, were made in England when the author of "As You Like It" was at the height of his prosperity. Mary, Queen of Scots, gave a watch to her maid of honor, Mary Setoun, fashioned in the shape of a skull, suggestive of the relationship between time and death. Watch cases used to be made in the shapes of books and boxes, and they finally took the form which they still retain—minus a slight difference in the design of the bow—at least 250 years since. The watch belonged to John Milton while the author of "Paradise Lost" was yet known to his friends as the beautiful student of Christ's College, Cambridge, and was, in the year 1874, bequeathed by Lady Fellows to the British Museum. Either Edward Barlow or Daniel Clarke invented the repeater. Barlow claimed the merit of the invention, and tried to get a patent for it, but James II, at the instance of the Clockmakers' Company, decided in favor of Quare. Thompson thought out the cylinder escapement, with horizontal wheel, during the reign of Dutch William, about which time Nicholas Faero, in connection with the Debaufres, Peter and Jacob, took out an English patent, but the Clockmakers' Company, jealous of foreign rivalry, prevented them from getting an extension of the privilege by pretending that one of their fellowship, Ignatius Huggford, anticipated Faero, and so the House of Commons decided against him. Huggford was an impostor. He had, it appears, applied jewels to watches, but only as a sham, intended to deceive. Volumes might be written on the history of escapements and balances. Yet none of the long series of the ingenious inventions which go to make up even a low-priced modern watch excites our wonder so much as the marvelously exact mechanical appliances which the manufacture has called into being.

New Light Drill.

The machine shown in the accompanying engraving has been designed by the makers, Messrs. Mayall & Thompson, of Philadelphia, for light drilling, the parts being so sensitive that the least clogging or sticking is instantly felt by the operator; consequently, small drills can be used with great rapidity, but with perfect safety. The spindle is operated by lever-feed. It is balanced and can be adjusted to any height from the table. It is also specially suited to drilling and reaming the centers of short shafts, the end resting in a cup which keeps the lower center of the shaft in line with the drill. It can be instantly placed to suit any length up to the full capacity. As may be seen by the engraving, the cones have three changes of speed. Tight and loose pulleys,



New Light Drill.

with belt shifter, are attached directly to the machine. In all respects this machine is strongly built, so as to endure the most severe usage to which it is ever liable to be subjected. The makers state that great care has been taken in its construction, and claim that it is the best tool in the market for the work it is designed to do. The greatest distance from the spindle to the table is 12½ inches. The greatest distance of the spindle to the center of cup is 48 inches. The swing is 11 inches. The total weight of the machine is 225 pounds.

President Barnard, of Columbia College, in a letter published yesterday in an afternoon paper, gave the result of careful computations which he had made relative to the disintegration of the Central Park obelisk's surface due to exposure to the weather. His opinion is that it will take 6000 years of exposure in this climate to reduce the volume of the Obelisk to the depth of 1 cm. on each side. "The waste in a century would be, therefore, scarcely a perceptible amount," he concludes.

Malleable Iron Blocks.

Our readers have observed the recent departure in the tackle-block line—the making of malleable iron blocks under the various patents of Capt. Geo. A. Ford—which has been commenced by some Cleveland capitalists, incorporated as the Cleveland Block Company. This company was organized about a year ago, since which time they have been perfecting their arrangements for manufacturing a full line of tackle blocks, to compete in form and price not only with wrought-iron blocks, but more especially with wooden ones. To that end their regular line of goods is made to conform in shape to the smooth outline of the wooden block, while being at the same time more compact and handsome, and having two points in its favor on which the manufacturers lay emphasis—first, the width of score, which is equal to a wide mortise wooden block, allowing much freer play for the rope; second, the strength and simplicity of the roller bushing used in the patent blocks, a feature especially valuable in marine use, where they are subjected to a great strain. The snatch block, as shown in the cut, has a patent automatic clutch, very simple and efficient, while in the larger sizes an inside wrought-iron strap aids in giving great strength. The special style of hollow shells used in their wire-rope blocks allows of extra sized and very strong, thick flanged sheaves, while inside wrought-iron straps to aid in supporting the pin, as in the snatch blocks, afford great strength with little additional weight. The sheaves of all large purchase blocks are also, if desired, furnished, without added cost, with a self-lubricator which, it is said, will last for months and is easily re-



Malleable Iron Block.

newed, furnishing an evenly-oiled bearing, while at the same time they can be used as common sheaves at will. On these and other points, with special care to secure the best material and workmanship, the manufacturers base their claim to a strong and durable block, light, handy and cheap.

The Use of Natural Gas in the Iron Works of Western Pennsylvania.

Some 10 years since considerable interest was excited over the statement made regarding the natural-gas wells of Western Pennsylvania. Gas, it is well known, is found to a greater or less extent in connection with nearly or quite all petroleum wells. This has led to the belief that the source of petroleum is the gas, evolved in the formation of coal, condensed. The gas accompanying petroleum is in many cases utilized for raising steam to be used in pumping the wells when they cease to flow. In addition to this gas that accompanies the petroleum, a number of wells have been bored that produce only gas, or gas accompanied with salt water. One of the first of these gas wells to be utilized in connection with iron manufacture was the well at Leechburg, used in the sheet-iron works owned by Rogers & Burchfield at that time, and now operated by Kirkpatrick & Co. This well had been bored in hopes of discovering petroleum, but no oil was found, and after being allowed to blow into the air for some time, the gas was conducted to the works of Rogers & Burchfield as an experiment, with so great success that for some nine years these works have been run entirely with gas from this well. Some time after this a gas well was opened up in Butler County, Pa., back of Taurenum, and some 16 miles from the Pittsburgh iron mills. This gas also was allowed to escape for some months, and finally a company was formed to bring the gas in iron pipes to Pittsburgh, where for some years it has been used at the works of Spang, Chalfant & Co.

For some years these comprised the chief attempts to utilize natural gas in Pennsylvania. Recently, however, in view of the discovery of other wells, quite an extension of its use has come about, and a still further extension is contemplated in the near future. Another well was bored near the Leechburg well already mentioned. Other wells were sunk in connection with the supply furnished Spang, Chalfant & Co., and within the present year some gas wells near Murrysville have been utilized to supply not only the private residences and stores in the East end of Pittsburgh, but also some other iron works. The Pennsylvania Fuel Company are supplying the works of Wilson, Walker & Co., who have ceased the use of coal entirely and are using nothing but natural gas, while the Gas Fuel Company are laying pipes from Murrysville toward Pittsburgh, and negotiations are in progress for its use at the Edgar Thomson Steel Works, the works on Second avenue, and even on the South side, should the supply continue. The Ford Plate Glass Works, at Hite's Station, some 20 miles above Pittsburgh on the Allegheny River, are also operated with natural gas. The advantages claimed for the gas are absence of the dirt and waste connected with the use of coal, evenness and steadiness of the heat produced, improved quality of the iron, growing out of the absence of sulphur in the coal and this evenness of heat, and cheapness. There certainly must be great advan-

tage in using this gas as a fuel, or in a place where fuel is as cheap as it is in Western Pennsylvania there could be no inducement to employ it. In connection with this, the absolute necessity of using gas as a fuel of the future cannot but be present. Our methods in the consumption of coal are wasteful in the extreme. The amount of the absolute heating power of the coal that is utilized at present bears but a very small proportion to that which should be secured, and as the necessity becomes more urgent that iron be produced cheaper, the economy of fuel and the improvement in the quality of the product growing out of the use of gas must force it upon the attention of iron manufacturers and compel the adoption of this fuel. The chief hindrance to-day to the rapid introduction of gas as a fuel in iron works are not only the additional cost of plant that would be required, and the royalties on the different forms of producers and furnaces introduced, but the additional expense that would be entailed by the charging to profit and loss of much of the puddling furnace plant already in use at these mills, and though this may for a while interfere with the adoption of gas, it is evident that in the near future gas must be a fuel, and the probability is that the use of natural gas in Pittsburgh will so convince consumers of the advantages of gas as to lead to the adoption of coal gas in places where the natural product cannot be obtained.

Cuba and American Trade.

Our trade relations with Cuba and Spain remain in the same unsatisfactory condition complained of for many years past, but there is some hope that remedial action will be taken in the next session of Congress. The trade of Cuba and adjacent islands under Spanish jurisdiction belongs to us, in large measure, by right of geographical position, but "more favored" nations, under existing treaties, derive therefrom the highest advantages. The United States Consul-General at Havana, who is now on a brief visit to this city, when speaking on this subject, said: "The trade relations between the United States and Cuba could not be worse. Owing to our nearness to the island, our merchants should have the monopoly of trade, but they are practically shut out, while Great Britain and Germany have everything. Our treaty with Spain does not give us the standing we should have. There is no 'most favored clause' in it, and, compared with Germany, France and England, we are at a great disadvantage. American flour is in great demand in Cuba, and it is shipped to Spain, thence to Cuba, cheaper than it could be sent direct from New York. This is owing to the fact that heavy duties are imposed upon all American goods landed at Cuban ports. American merchants living in Cuba are still required to pay special war tax, levied to defray the expenses of the last insurrection, but in many individual cases I have interceded to prevent this imposition. Owing to Prince Bismarck, Germany comes under the clause of 'most favored nations,' and his countrymen escape this taxation. I cannot speak for British subjects, but I believe that some of their merchants are compelled to bear their share of the burden."

The large shipments of American flour to Cuba via Spain, as above noticed, is only one of many facts which indicate the abnormal state of our trade relation with Spain and her dependencies. It is stated by a merchant of this city, formerly a resident of Spain, that although France grows no cotton, she sold to Spain in the year 1881 nearly \$2,000,000 of the raw material, which was undoubtedly grown in the United States, but was first shipped to France—one of the more favored nations—thereby saving one-fifth of the duties imposed on shipments made direct. Other articles show a like disproportion to the disadvantage of American trade. For example, there is a duty on common glassware of \$1.54 per 220 pounds when brought from the United States; if from a more favored nation, \$1.15. Forged iron and steel rails from the United States pay \$1.58 for 220 pounds, but if from other countries, 90 cents; iron bars and sheet iron pay \$2.55 per 100 pounds, and other countries \$1.76. At present Spain buys of us comparatively little besides cotton, petroleum, distilled spirits and tobacco, but her maritime commerce is rapidly growing, and the constant causes of irritation arising between Spain and other European governments have prompted her statesmen on more than one occasion of late to discuss the expediency of meeting the United States in certain proposed measures of reciprocity. She is doubtless constrained to seek this course of action, and perhaps chiefly for the reason that our increasingly intimate relations with Mexico may lead to the development of important interests inimical to her own, particularly as to the growth of sugar-cane and coffee. Considerations of this character are supposed to have influenced several prominent gentlemen in the New York Chamber of Commerce, some months ago, in preparing the draft of a proposed treaty with Spain, of which we may hear by and by.

Soft Alloy For Soldering.—A soft alloy which attaches itself so firmly to the surface of metals, glass and porcelain that it can be employed to solder articles that will not bear a very high temperature, can be made as follows: Copper dust obtained by precipitation from a solution of the sulphate by means of zinc is put in a cast-iron or porcelain-lined mortar and mixed with strong sulphuric acid, specific gravity 1.85. From 20 to 30 or 36 parts of the copper are taken, according to the hardness desired. To the cake formed of acid and copper there is added, under constant stirring, 70 parts of mercury. When well mixed the amalgam is carefully rinsed with warm water to remove all the acid, and then set aside to cool. In 10 or 12 hours it is hard enough to scratch tin. If it is to be used now, it is to be heated so hot that when worked over and brayed in an iron mortar it becomes as soft as wax. In this ductile form it can be spread out on any surface, to which it adheres with great tenacity when it gets cold and hard.

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From Our Regular Correspondent.)

LONDON, ENG., Oct. 22, 1883.

THE SITUATION

does not seem to have improved since I last put pen to paper on your behalf, nor are we able to perceive any indication of a forthcoming change for the better. In saying "we," I class myself with the average men of business who have had a good many years' experience of the iron trade, and are still dependent thereon in a great measure. At this juncture I am inclined to attach a good deal of importance to experience, especially as I find there is still a marked disposition in some oversanguine quarters to predict another boom and a general rise in prices. It is possible, of course, that such things may come about, just as it is possible for snow to fall in July in this country, but, so far as I can see, the probabilities are about alike in either case. I can quite understand why the bulls should publish and preach their own views and wishes, but I cannot understand why or how manufacturers should entertain such opinions, and, what is more, actually build business structures on such a bad foundation. There can be no doubt whatever that 99 out of every 100 manufacturers would be delighted to experience a revival in trade, but they must be foolish indeed to pursue a *laissez faire* policy in order to prove their faith in their own desires. Any iron man with even a moderate experience must know that the prospect of a rise is just now of the most problematical and visionary kind. Where is the boom to come from? What markets are undersupplied with manufactured products, or what manufacturers are unable to supply the demands made upon them? Not a single one. On the contrary, all reports are in unison as to the necessity for limiting the production of manufactured goods; all accounts deplore glutted markets and almost unprecedentedly low prices, and we hear from all quarters of the impossibility of maintaining competition at its present high state of tension. The inference is, indeed, that the world as a whole is producing a greater quantity of manufactures than the world as a whole can consume or use. Great Britain is no longer the sole manufacturing center of the globe. We are hard pressed by our German, French, Belgian, Austrian and Scandinavian competitors, who not only supply their own requirements in almost all the commoner grades of goods, but are so far ahead of their own capacities as consumers that they are each and all making most strenuous efforts to cultivate export business. This is in Europe. In the Western Hemisphere the great market of the United States is not merely lost to us, but is practically overdeveloped—your manufactures have increased beyond your wants, and your market is almost or quite as dull as our own. Canada is also fostering its own industries, and in some respects capable of supplying its own wants. In the Australias the Colony of Victoria is again giving evidence of its devotion to protection, and is about to impose heavier duties on agricultural implements and certain kinds of iron and steel, as well as on hardware. Even Japan is marching rapidly on the same road, as is shown by an interesting report just received by the Foreign Office from our Consul at Hiogo, but too long to quote here.

Briefly, then, production is everywhere on the increase, and it seems to me to be extremely probable that the consumption has not increased, and is not growing, in anything like the same proportion. That there is a vast area of the world's surface yet to be reclaimed and managed by civilization is beyond dispute, but that fact does not alter my opinion that we are ahead of the market. Another point to be borne in mind in this connection is the consideration that the modern fiscal systems of the different countries of the world have a very strong tendency to localize the various markets. The fostering of home industries at all costs leads the manufacturers to pay most attention to the wants of the market which is immediately around them, and within which they are protected from the rivalry of foreigners. So long as trade is good (and it must be remembered that the prosperity of trade depends upon many conditions) the system may work smoothly, but directly there is a break the descent is very rapid, and there is no well-knit export connection on which to fall back until the trouble at home shall have been disposed of. Every protected country feels this pinch at times, and Great Britain is also nipped, because we are shut out of so many markets that we must depend more upon our own and upon the neutral buyers, who are beset by the importunities of the entire manufacturing world. It is thus abundantly plain that the old methods of doing business have been overturned and improved out of existence, so that all calculations based upon well-worn data must needs be revised. As I said at the outset, therefore, I fail to see where any spurt of moment is to arise, and I finish by stating that there is nothing whatever to bring about such a change in the near future. Were I a professional vaticinator I would rather foretell a further depression, as foreshadowed by the alarming decrease of orders for shipbuilding and many similar circumstances. Not knowing, however, I will venture to imitate Mr. Lincoln's axiom and will not prophesy, but, like Mr. Micawber, will calmly await whatever may "turn up."

THE IRON MARKET

has been fairly steady during the week, and prices may be termed firm, notwithstanding the circumstance that only a very moderate amount of business has been transacted in the open market in any kind of iron. The steadiness of values appears to arise, in fact, solely from the apprehension of serious complications in the labor market, and in no sense owing to any expansion of the demand for home use and for export. In many branches of the trade, indeed, it seems to be beyond question that the consumptive demand is on a very limited scale, while the virtual close of the northern navigations must tend to the restriction of shipments, and needs no special discernment to perceive

that in the absence of an enlarged demand prices can only be influenced in an upward direction by the operation of causes which would either very materially restrict the production or so increase the prime cost as to render higher selling values absolutely imperative. In some quarters it is held that the agitation of the miners and the unsettled condition of some of the ironworkers will culminate in a manner likely to have serious effects upon the iron trade, and it is entirely on the strength of this contingency that tentative efforts are being made here and there to enhance quotations. Such efforts may or may not prove successful, but present appearances are rather against them, seeing that the labor movements, which are their sole foundation, are as yet in their initial stages and may never reach fruition. The colliery owners have confirmed their resolution not to make the concessions asked for by the miners, but an interview will shortly take place between the two parties, at which the respective views of each will doubtless be more clearly defined. At Glasgow the warrant market has suffered a relapse, and prices have undergone a marked decline, closing on Friday at 45/6 per ton. The fall is said to be attributable to "bear" operations, and has occurred in the teeth of a diminished output and fairly satisfactory returns as to shipments and consumption. The enormously large stocks held in Connal's stores, however, favor the operations of the "bears," and will indubitably prevent any rise in value of moment so long as they exist. Advances from your market are not very favorable to Scotch pig, and current sales are light, with a poor outlook for the near future. At Middlesboro' pig iron is again very quiet, and prices are irregularly weak, No. 3 having changed hands, it is said, at as low as 38/9 per ton, while makers ask 39/3 @ 39/4 1/2. The market seems to be in the hands of the "bears," and futures are distinctly weak. Shipments are on a fair scale, and the local consumption is good, but prospects beyond the end of the year are not specially bright. On the West Coast there is no change to note in selling values, although several good forward contracts have been entered into on home account at about current figures. For mixed parcels of Nos. 1, 2, and 3, in usual proportions, we still quote 48/ @ 49/5 per ton, with general makers' brands at 49/6, 49/ and 48/ respectively for Nos. 1, 2, and 3.

In connection with pig iron, it is interesting to note that the new British Iron Company have just entered the market as vendors of various grades of pig, which they are enabled to supply owing to an enlargement of their powers of production. Their prices are as under: Corngraves, No. 1, 85/; No. 2, 80/; No. 3, 80/; No. 4 and 5, 83/; M. W., 83/-all cold-blast. Their "Lion," Nos. 1 and 2, hot-blast, are 70/ and Nos. 3, 4 and 5, 67/6; N. B. 1, Co., M., No. 1, 50/; No. 2, 50/; "Forge," 47/; N. B. 1, Co., C., No. 1, 43/ and "Gray Forge," 40/-all per ton at the works—Corngraves or Ruabon, according to brand. Elsewhere crude irons are about as quoted last week, with the majority of the smelters respectively sold forward over the remainder of 1883. Fencing and certain other sorts of wire have been reduced by 20/ per ton by the Warrington and Shropshire manufacturers, but it is openly stated that prices are still quite nominal. The galvanizers report a steady turnover, and the majority of them seem inclined to adhere to the new quotations fixed at last week's meeting of the trade. In heavy manufactured iron there are no changes to note, and ordinary finished iron is also as fully described in my report of the quarterly meetings of last week. So far as I am enabled to learn, there is no semblance of activity in marked or other best iron, although there have been fairly good sales of medium and common grades. Ordinary Welsh bars are a trifle firmer at 25/ 6/3 @ 25/ 7/6 for India assortments. For sheets the call is pretty well sustained, especially for galvanizing and working-up purposes. Hoops and strips are in moderate request, but in chain and cable iron there is a satisfactory turnover. In iron rails there is nothing new. Old rails are inquired for on account of Philadelphia, but offers are said to be below holders' views. Meantime large shipments of all sections to Italy are relieving the market of the surplus stock. Heavy wrought scrap iron is quiet at 55/ @ 55/6 per ton, f.o.b. London, &c. Freighters are inclined to be easier, pig iron by ordinary steamers, Glasgow to New York, being called 5/ @ 6/ per ton. Liverpool, London and Bristol Channel rates are quiet and nominal. The continued competition for outward cargoes from Antwerp is a serious matter for certain classes of English manufacturers, although it may benefit the French and German concerns. As I understand the matter, steamers are bringing wire, rails, &c., free from Antwerp to London, in order to secure the freightage from London to Australia, China, the Cape, and Eastern ports. Steel is without changes to note, the Sheffield houses having only a moderate amount of work in hand. The Bessemer and Siemens concerns are busy. Bessemer bars are 28/ @ 29/; hoops, 28/ 10/ @ 29/; sheets and plates, 21/ 10/ @ 21/5 per ton. For old railway leaf-spring steel buyers offer about 66/ @ 67/ per ton, f.o.b. London, &c., and a few parcels have been sold for the United States on that basis. Steel rails remain very quiet at about my late quotations, but it is difficult to give exact figures, inasmuch as in the few transactions about prices are kept private. The mills are busy, but futures beyond Christmas are scarce. Boleck, Vaughan & Co. would seem to be running through their orders, seeing that they have given 300 men in the rail departments notice to leave. This may be merely a preliminary to reduced wages, but it is believed to mean that the men will be discharged. Cammell & Co.'s new mills at Warrington were started on October 18, six months only having served for the removal of the whole of the plant from Dronfield—over 100 miles distant. These mills will turn out between 300 and 400 tons of rails weekly, and are to be run full time on orders which have been accumulated during the removal.

SCOTCH PIG IRON

has been "down on its luck" since my last report, and prices have fallen under adverse

bear operations and the prevalence of an impression that the absence of new orders in the shipbuilding branches will bring about a very general depression of the allied industries. Even a report of the temporary stoppage of a number of furnaces at Gartsherrie, and the advance of 6d. per day given to some of the miners, failed to correct the falling tendency. Warrants have dropped to 45/5, as against 50/7 1/2 a year ago, while there are now 104 furnaces at work in Scotland, compared with 114 this date 1882. In Connal's stores there are 589,338 tons (an increase on the week of 169 tons), against 621,806 tons same date last year. Last week's shipments were 2412 tons below those of the corresponding week of last year, but to date this year the increase has been 5581 tons, while importations of Middlesboro' pig into Scotland have increased by 21,633 tons. Writing from Glasgow on October 20, James Watson & Co., said: "The Scotch iron market has been exceedingly depressed throughout the week, the price of warrants having fallen 1/ per ton, this being caused by holders realizing. Several furnaces have been put in blast the total being now 104. The demand for makers' iron is dull, although shipments are heavy, these being chiefly in execution of old orders. The warrant market here was flat last Monday, with a moderate business done between 46/5 1/2 and 46/3 1/2 per ton, and on Tuesday the price further receded to 46/1 1/2, cash. On Wednesday the decline continued from 46/2 to 45/10 1/2, and yesterday a very large business was transacted between 45/11 and 45/7 1/2 per ton. To-day a large quantity changed hands between 45/8 and 45/5 1/2 per ton, closing buyers 45/6, sellers 45/7 per ton."

The shipments last week were 11,757 tons, as compared with 14,199 tons for the corresponding week of last year. We quote:

	No. 1.	No. 2.	No. 3.
G. M. B., at Glasgow	47/6	45/6	43/6
Clyde	49/6	47/6	45/6
Coltness	57/6	55/6	53/6
Langloan	57/6	55/6	53/6
Gartsherrie	57/6	55/6	53/6
Summerlee	56/6	54/6	52/6
Calder	56/6	54/6	52/6
Carnbroe	54/6	52/6	50/6
Glenarnock, at Ardrossan	54/6	52/6	50/6
Eginton	47/6	45/6	43/6
Dalmellington	47/6	45/6	43/6
Shotts, at Leith	57/6	55/6	53/6
Kinnell, at Ho-ness	48/6	46/6	44/6
Carron, at Grangemouth	48/6	46/6	44/6

MIDDLESBORO' PIG IRON

has also been weak and dull, with a relapse in values, in sympathy with the Glasgow warrant market. The fall of values in Scotland speedily touches Middlesboro', as the latter does a very large business with Scotland—a business which is larger in proportion, as Scotch pig is dearer than Middlesboro'. For No. 3, 38/9 @ 39/ has been accepted during the week, and G. M. B., f.o.b. at makers' wharves in Tees (less 2 1/2%), for cash, are:

No. 1 Foundry	43/	Mottled	37/
" 2 "	41/ <td>White <td>36/ </td></td>	White <td>36/ </td>	36/
" 3 "	39/ <td>Refined Metal <td>35/ </td></td>	Refined Metal <td>35/ </td>	35/
" 4 "	38/ <td>Kentledge <td>34/ </td></td>	Kentledge <td>34/ </td>	34/
4 Forge	37/6	Cinder <td>34/</td>	34/

Mr. Lowthian Bell is improving, but is not yet at all convalescent or able to attend to his ordinary avocations.

WEST COAST HEMATITES

are still without change, although it is stated that large contracts have been made for next year's deliveries by home consumers. For mixed lots in usual proportions 48/ @ 49/ is asked, but there is reason for believing that large buyers obtain more favorable terms. Certainly such prices are low enough to attract business if there be any about, which is doubtful. Makers' brands are nominal at the following figures:

	No. 1.	No. 2.	No. 3.
Cleator	52/6	52/	50/6
Lonsdale	49/6	49/	47/
Warrington	49/6	49/	47/
Lowther	49/6	49/	47/
Distington	49/6	49/	47/
Harrington	49/6	49/	47/
Solway	49/6	49/	47/
Maryport	49/6	49/	47/

There are 53 furnaces at work and about 48,000 tons in store. Last week's shipments included 15,025 tons of pig iron and 6665 tons of steel rails.

TIN PLATES

are firm, with a disposition on the part of makers to ask more money. It is rumored, however, that several additional mills are to be started, in which case prices may not advance much further. For I. C. cokes 16/6 @ 16/9, or even 17/, is asked, and heavy orders could be booked at 16/4 1/2, but makers will not give way a single point. There is still an enormous demand for coke-tin wasters, 14 x 10 and 14 x 20, at 15/6 per box; every box obtainable has been bought up for the States and India at the price named. A fair turnover is reported in best coke tins at 17/ @ 18/, charcoal tins at 18/ @ 20/, and best charcoal tins at 20/ @ 22/. Makers are well sold ahead in terms at 16/ @ 17/ for I. C. and 33/ @ 34/ for 28 x 20's. Messrs. Caine & Layborne, of Liverpool, advise me as under: "The Birmingham quarterly meeting was but thinly attended by makers, and only a moderate business was transacted in cokes, but at higher prices. Makers were very firm, as the position has considerably improved of late, stocks having been sensibly reduced at Liverpool and Welsh ports, and the demand continuing steadily and improving. Higher values may be expected in cokes, but charcoal at present do not show the same tendency to rise. Wasters continue scarce, and command high prices relative to primes."

REDUCTION IN WIRE

The leading manufacturers of wire at Warrington, Birmingham, &c., have just reduced their prices by from 10/ to 20/ per ton. I annex one of the new lists, which may be taken as representative of the whole. It is subject to 2 1/2 % discount for cash:

	No. 1.	No. 2.	No. 3.
B. W. G.	10/	9/	8/
Bright or annealed, per cwt.	13/0	12/6	12/0
Galvanized, per cwt.	13/0	12/6	12/0
B. W. G.	11/	10/	9/
Bright or annealed, per cwt.	14/0	13/6	13/0
Galvanized, per cwt.	14/0	13/6	13/0
B. W. G.	12/	11/	10/
Bright or annealed, per cwt.	15/0	14/6	14/0
Galvanized, per cwt.	15/0	14/6	14/0
B. W. G.	13/	12/	11/
Bright or annealed, per cwt.	16/0	15/6	15/0
Galvanized, per cwt.	16/0	15/6	15/0
B. W. G.	14/	13/	12/
Bright or annealed, per cwt.	17/0	16/6	16/0
Galvanized, per cwt.	17/0	16/6	16/0

Extras.

	Per cwt.
Charcoal	5/0
Tinned	9/6
Charcoal, half-round	18/0

	Per cwt.
Coppered wire	1/3
Spring wire charcoal	6/0
Square wire	1/9
Cut to lengths	2/9
Wire in straight lengths	3/6
Drawn to pattern	0/0
Bessemer steel	4/8
Budley bagging	0/5
Cotton	0/3
Papering	0/2
Dressing	2/6

	Per cwt.
Wound in 1-b and 3-b hanks, 2/9 per cwt. Wound in 1-b hanks, 3/6 per cwt. Wound in 1-oz. or 2-oz. hanks, 1d. per lb.	
Small Round and Square Bar Iron.	
Inch. 7-16, 9/ 11-32 5-16 9-32 1/4	
B. W. G. 1 2 3 4 5	
per ton £6. 5/ £6. 10/ £6. 15/ £7. 0/ £7. 5/	
Inch. 7-16 8-16 9-16 10-16 11-16	
B. W. G. 5 6 7 8 9	
per ton £7. 15/ £8. 5/ £9. 15/ £11. 5/ £11. 10/	
Inch. 1 1 1 1 1	
B. W. G. 10 10 10 10 10	
per ton £13. 5/ £13. 15/ £15. 5/ £16. 15/ £16. 15/	

	Per cwt.
Best Rolled Fencing Wire.	
Oil, per ton £6. 10/ £6. 10/ £7. 0/	
Galvanized, per ton £9. 10/ £10. 0/ £10. 10/	

	Per cwt.
Best Drawn Fencing Wire.	
B. W. G.—Nos. 0-6 7 8	
Annealed and Oil, per ton £8. 10/ £9. 15/ £9. 15/	
Prepared Bright, per ton £9. 10/ £9. 15/ £9. 15/	
Galvanized, per ton £12. 10/ £12. 10/ £12. 15/	
Annealed or Bright Steel	
round or oval, per ton £9. 10/ £9. 10/ £9. 15/	

	Per cwt.
B. W. G.—Nos. 9 10 11 12	
Annealed and Oil, per ton £9. 5/ £10. 5/ £10. 5/	
Prepared Bright, per ton £10. 5/ £11. 0/ £11. 0/	
Galvanized, per ton £13. 10/ £14. 0/ £14. 0/	
Annealed or Bright, round or oval, per ton £10. 5/ £11. 5/ £11. 5/	

	Per cwt.
Best Drawn Killed Galvanized Telegraph Wire.	
B. W. G., per ton.—Nos. 0-5 7 8	
B. W. G., per ton.—Nos. 9 10 11 12	
per ton £16. 15/ £17. 5/ £18. 5/	

	Per cwt.
In long lengths of 1 cwt. each.	
Annealed Tinned Bottling Wire.	
B. W. G.—Nos. 18 19 20 21 22	
per cwt. 3/5 3/7 3/11 4/1 4/3	
B. W. G.—Nos. 23 24 25 26 27	
per cwt. 4/10 5/4 5/10 6/7 6/1	

	Per cwt.
Best Galvanized Strand, Three-ply.	
B. W. G.—Nos. 0 1 2 3 4 5	
Yards, per cwt. 139 219 227 275 340 430	
per cwt. 14/3 14/6 15/3 15/9 16/0 16/3	
B. W. G.—Nos. 6 7 8 9 10	
Yards, per cwt. 465 531 745 880 1000	
per cwt. 17/0 17/9 18/3 19/3 21/6	

	Per cwt.
Seven-ply.	
B. W. G.—Nos. 0 1 2 3 4 5	
Yards, per cwt. 165 200 225 260 305 335	
per cwt. 15/3 15/9 16/3 16/9 17/3 18/9	
B. W. G.—Nos. 6 7 8 9 10	
Yards, per cwt. 465 531 745 880 1000	
per cwt. 19/3 20/0 20/6 21/6 22/6 25/9	

	Per cwt.
Machine-cut Fencing Staples.	
B. W. G.—Nos. 5 6 7 8 9	
Black, per cwt. 10/9 11/3 11/9 12/9	
B. W. G.—Nos. 5 6 7 8 9	
Galvanized, per cwt. 18/3 18/9 19/3 20/3	

W. G.—Nos.....	6	7	8	9	10
ards, $\frac{1}{2}$ cwt.....	465	545	700	800	950
$\frac{1}{2}$ cwt.....	19/3	20/6	22/3	22/6	25/9
Machine-cut Fencing Staples.					
W. G.—No.....	5 & 6	7	8	9	
black $\frac{1}{2}$ cwt.....	10/9	11/3	11/9	12/9	

(For Wholesale Metal Prices See Page 18.)

Linen, -Linen Fab. dia 25 25
Cotton Chalk dia 55 55
Silver Lake, No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 8

Barn Door, inch.....	1/2	3/4	1	1 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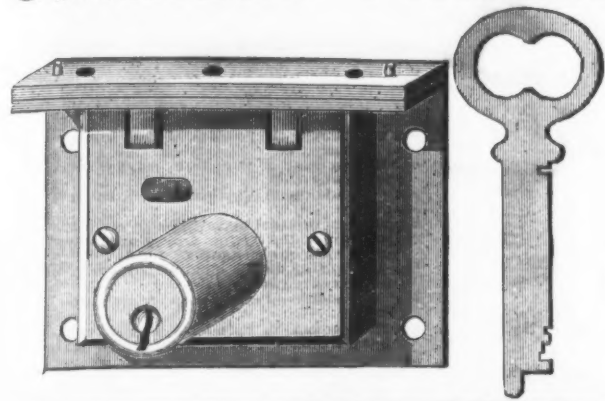
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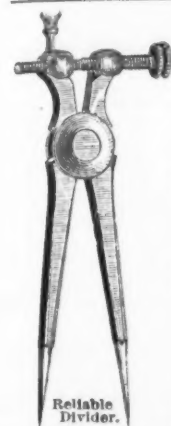
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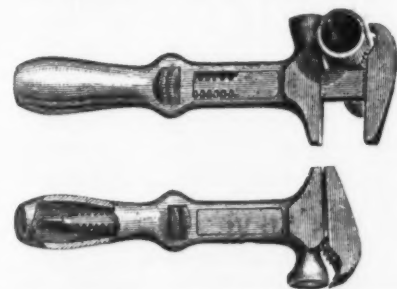
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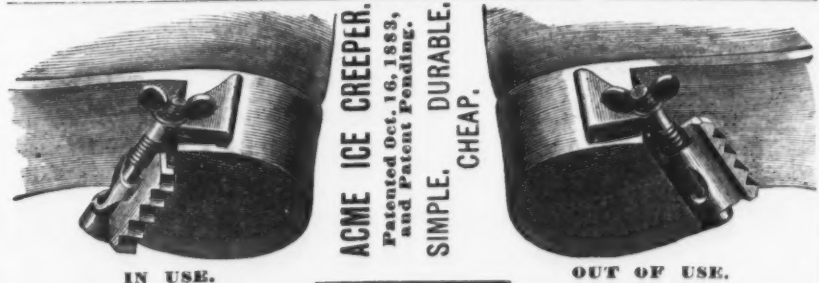


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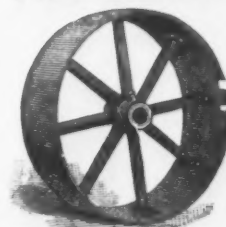
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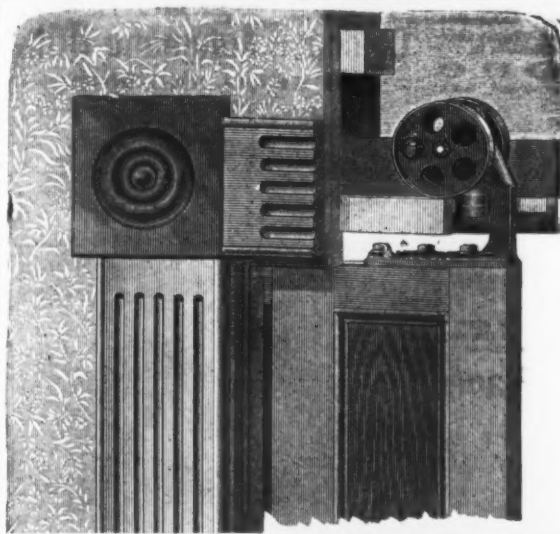
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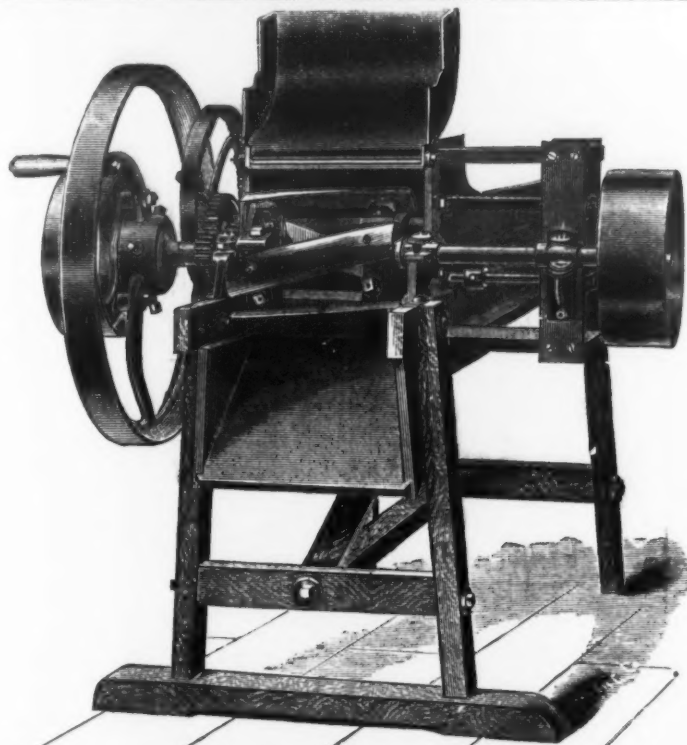
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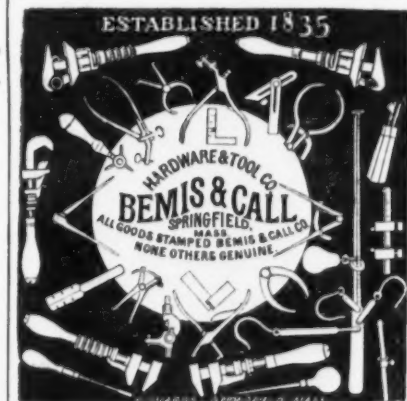
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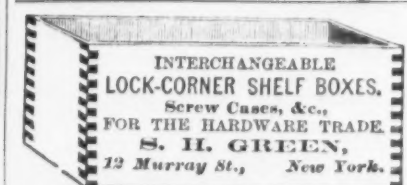
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Paul Chas. B., Williamsburg, England, 4
Spencer, Mathias & Sons, Sheffield, England, 4
Union File Works, Baltimore, Md. 4

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Climax Fire Brick Co., Pittsburgh, Pa. 2
Henderson & Co., Chicago, Ill. 2
Evans & Howard, St. Louis, Mo. 2
Garner James, Pittsburgh, Pa. 2
Hall, Thomas & Co., Portland, Me. 2
Kreischer B. & Sons, East of K. Houston, N. J. 2
Maurer Henry, 45 East 2d, N. Y. 2
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Ostrander Jarrett & Co., Troy, N. Y. 2
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Rhindston S. A., 40 and 42 N. 4th, N. Y. 2
Un-on Minir Co., Philadelphia, Pa. 2
Valentine M. D. & Bro., Woodbridge, N. J. 2
Woodland Fire Brick Co., Woodland, Pa. 2

Fishing Tackle.
Malleson F., Brooklyn, E. D., N. Y. 18

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Star Machine Works, Cleveland, O. 43

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Bulkitt T. H., Cleveland, O. 4
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Harrison E. & Son, Philadelphia, Pa. 43

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Chadborne & Coldwell Mfg. Co., Newburg, N. Y. 34

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Detroit Lubricator Co., Detroit, Mich. 6

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Sellers Wm. & Co., Phila. and 79 Liberty, N. Y. 41

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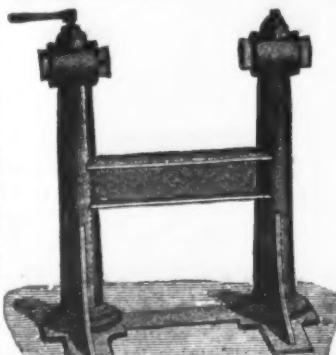
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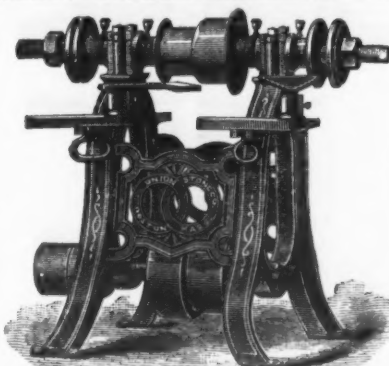


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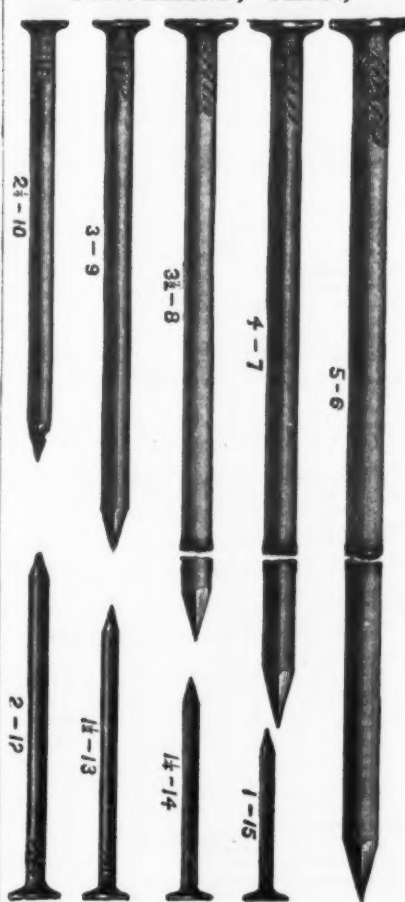
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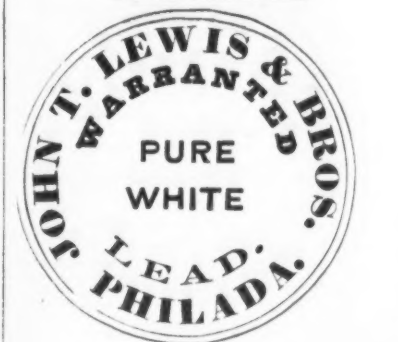
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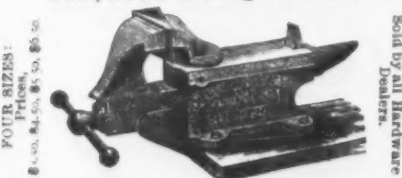


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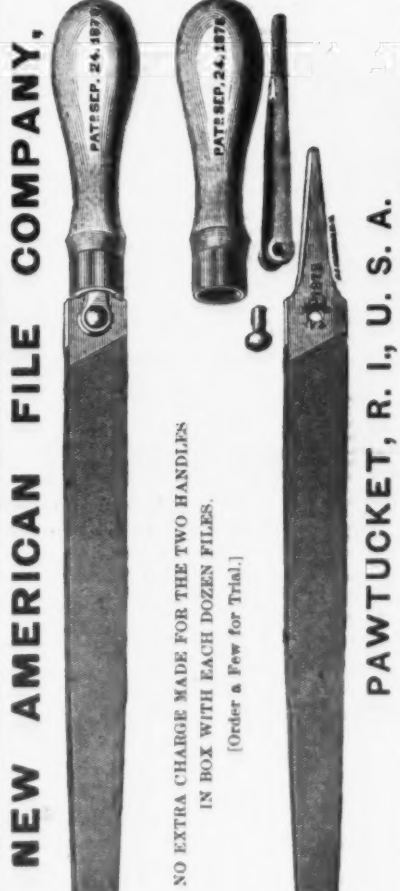
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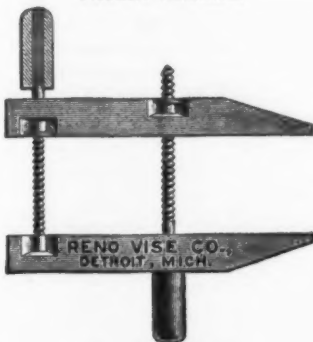
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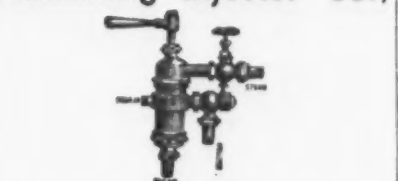


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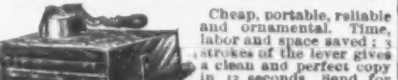
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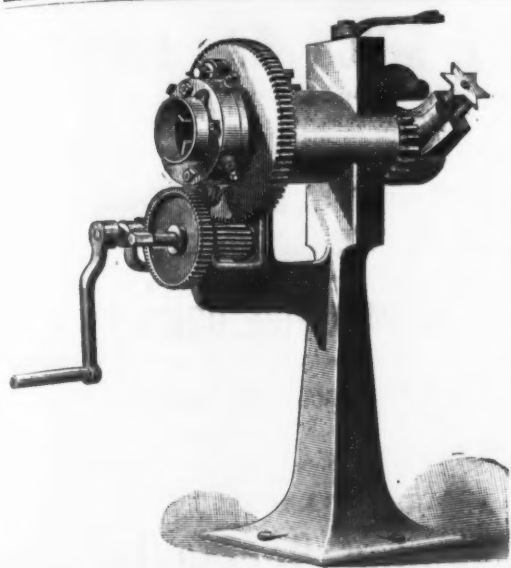
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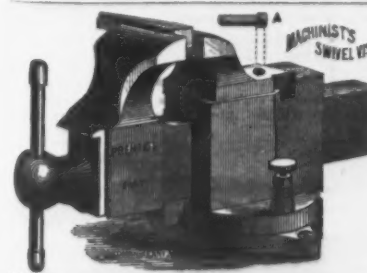
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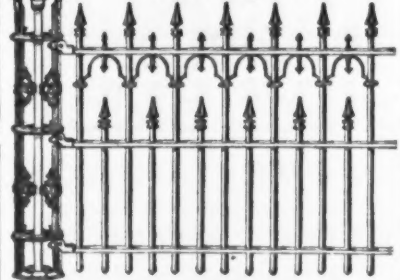
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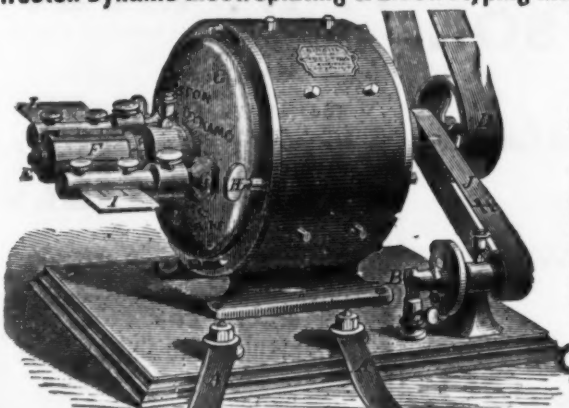
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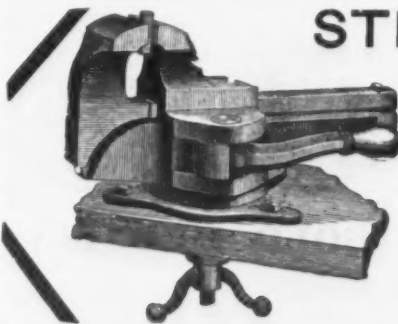


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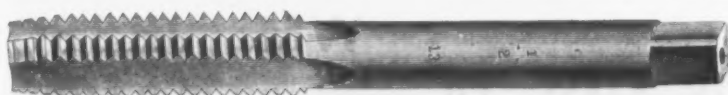


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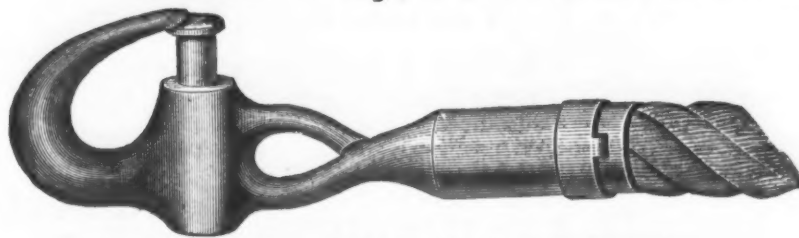
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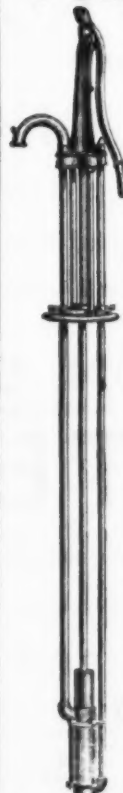
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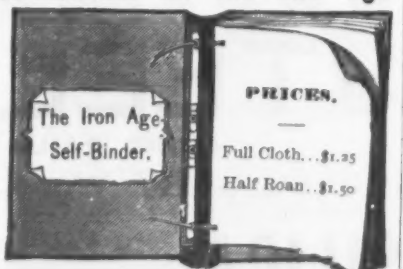
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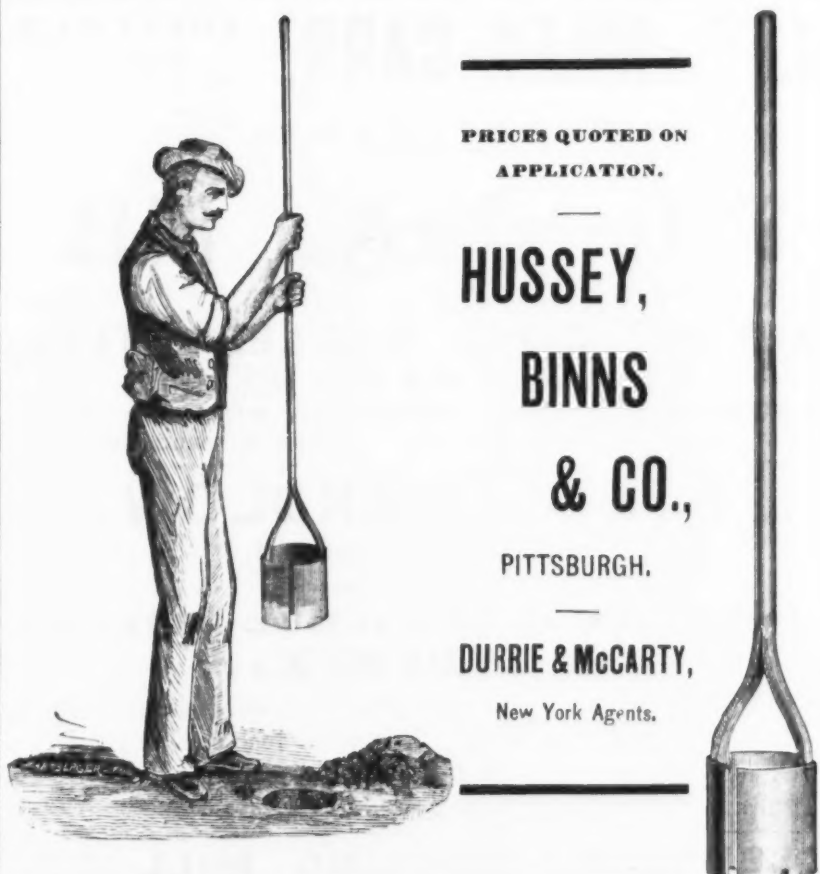
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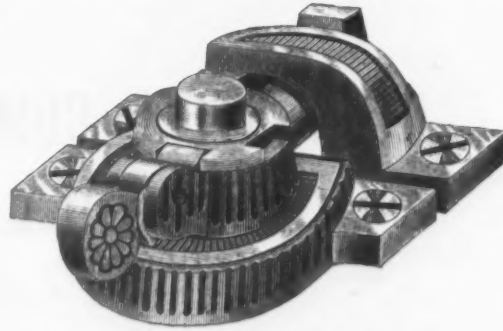
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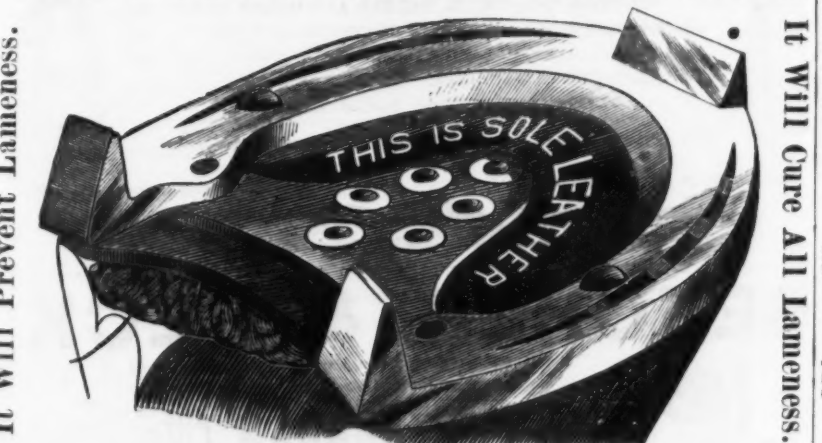
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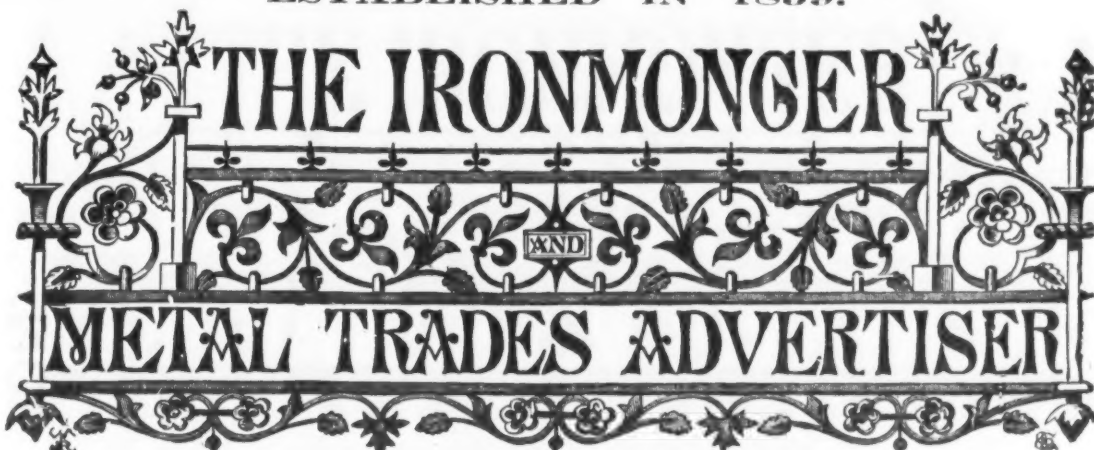
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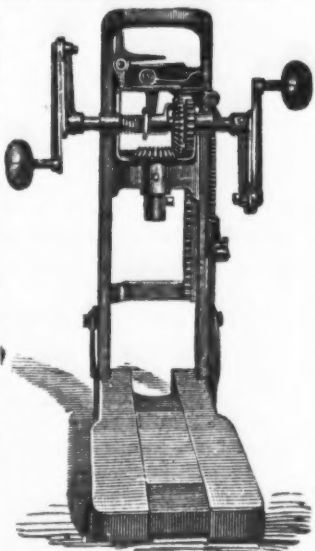
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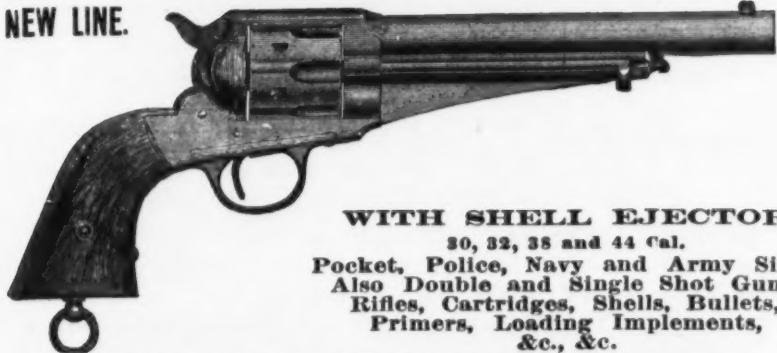
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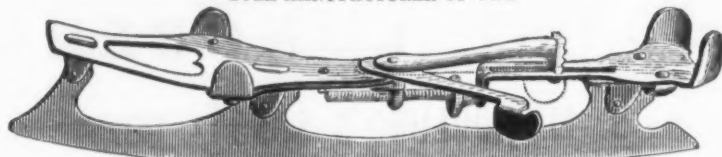
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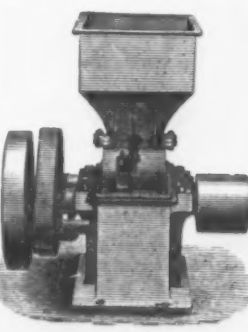
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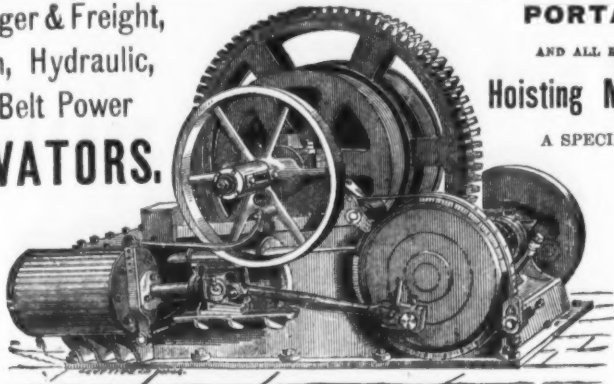
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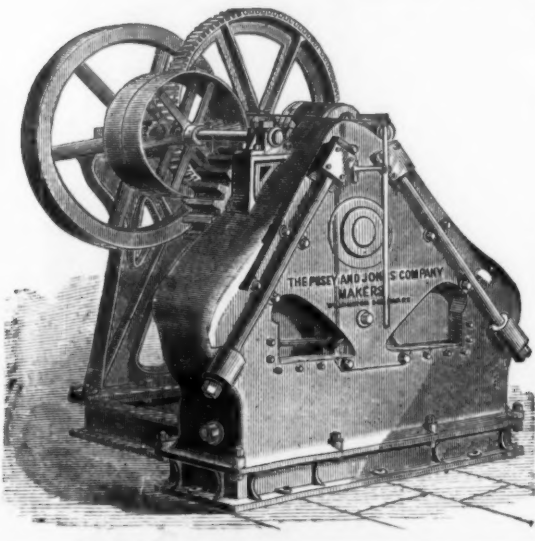
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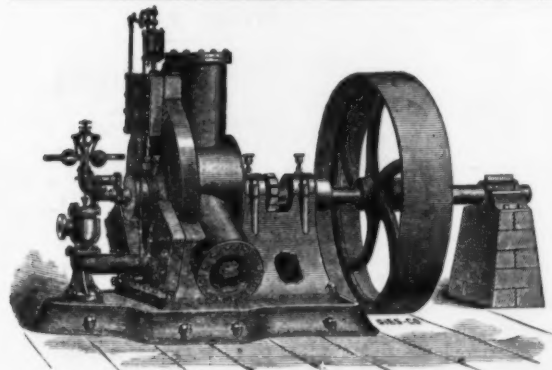
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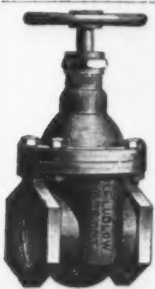
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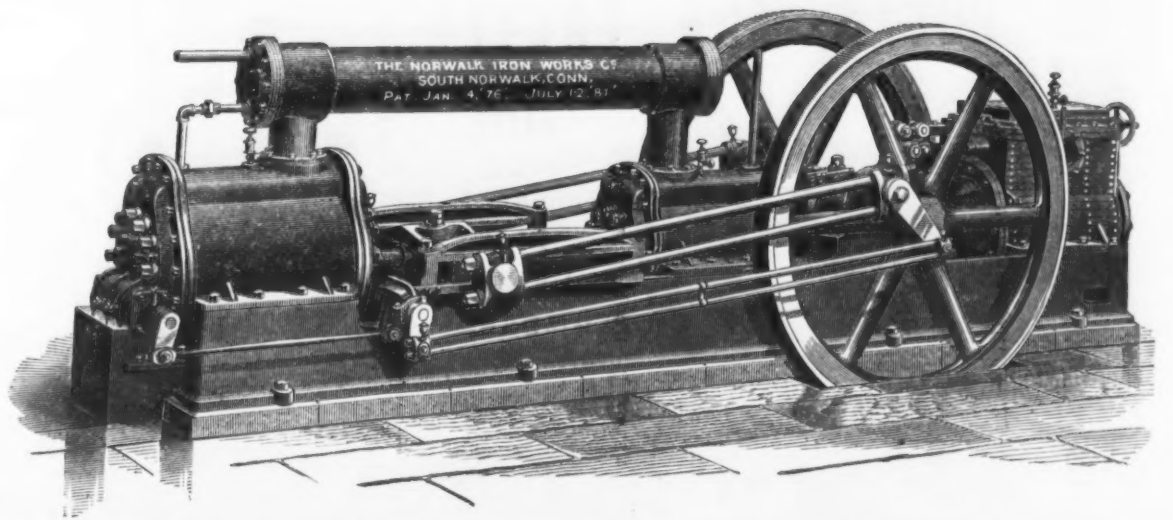
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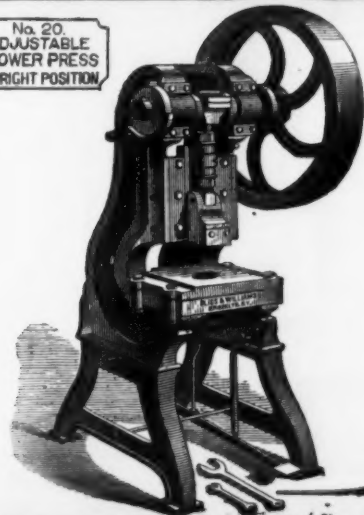


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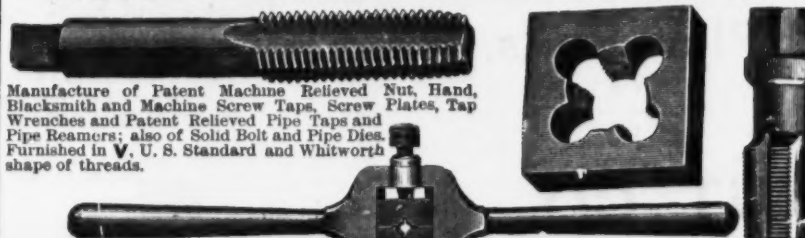
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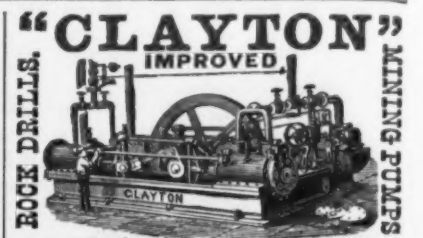
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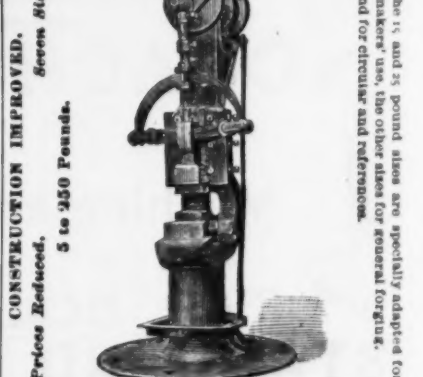


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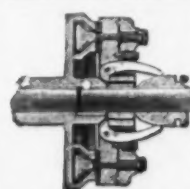
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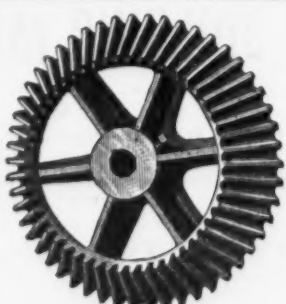
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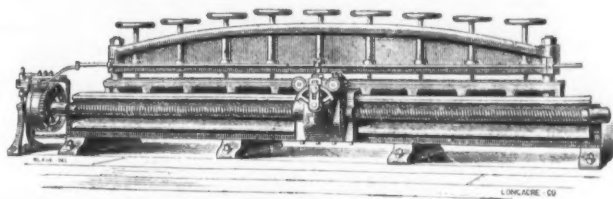
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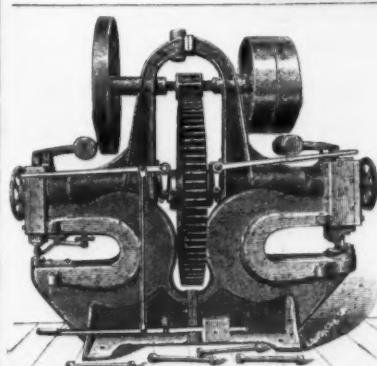
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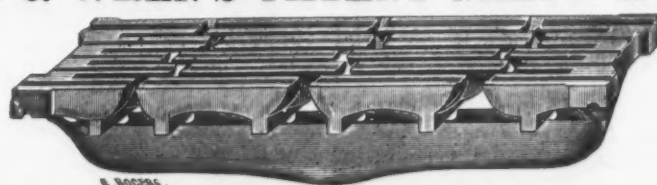
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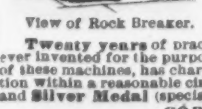
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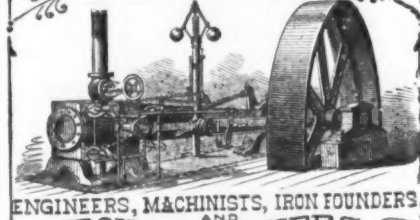
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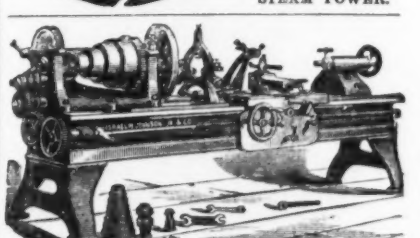
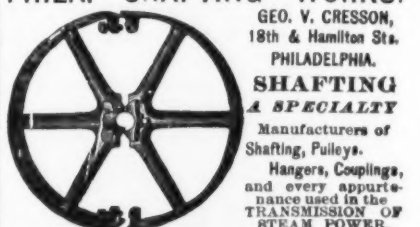
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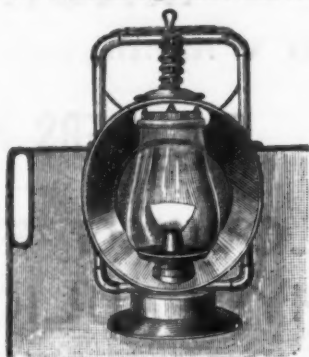
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